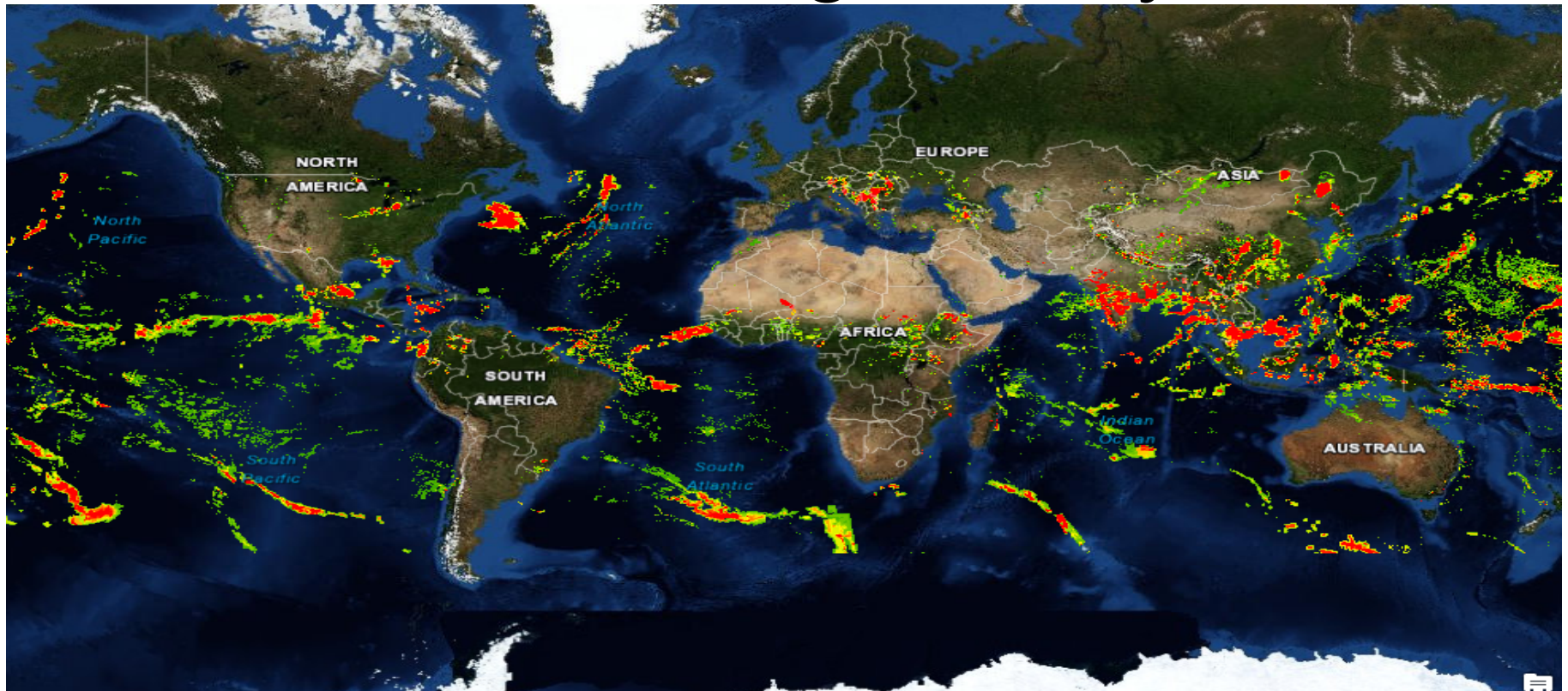
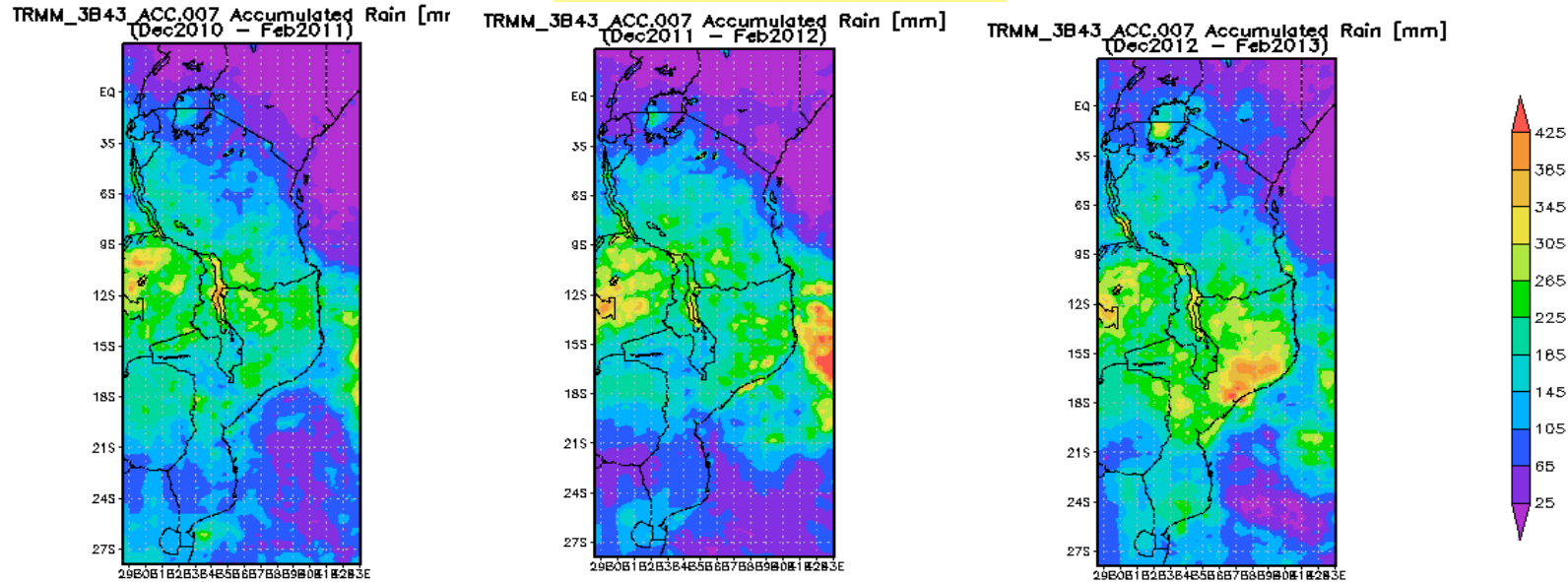


TRMM and GLDAS Monthly Data Acquisition and Importation to ArcMap for Water Budget Analysis

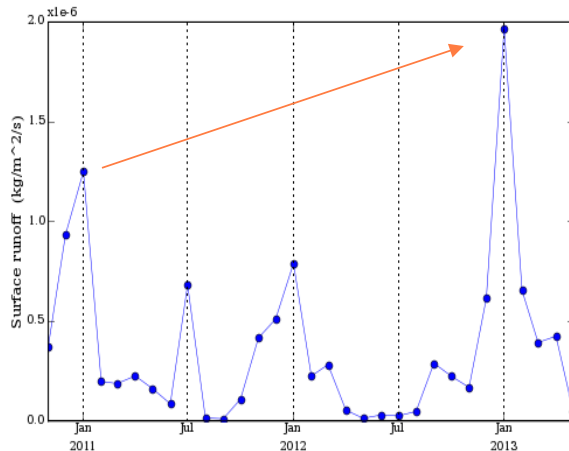


Heavy Precipitation Conditions over Limpopo River Basin (Southern Africa) in 2013

TRMM Accumulated Rainfall



Area-Averaged Time Series (GLDAS_NOAH025_M.001)
(Region: 25E-39E, 33S-17S)



- Seasonal and annual variability in accumulated rainfall data products due to its relevance to heavy rainfall conditions

- Seasonal and annual comparisons:

Dec-Feb (2010-2013)

- In relation to surface runoff (kg/m²/s) obtained from GLDAS

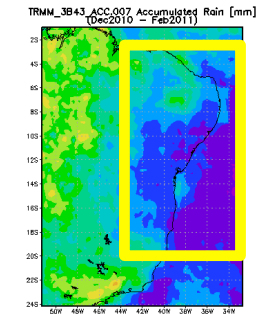
- Freely available NASA data will be imported into GIS where it can be examined together with GIS layers

(hydrologic basins, river networks, elevation, soil type, agricultural lands, dams, reservoirs, population)

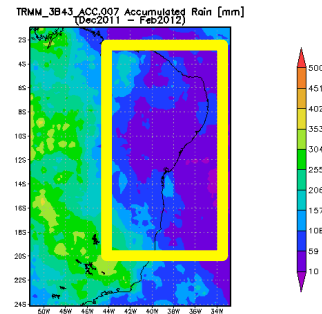
Drought Conditions over Brazil 2012

TRMM Accumulated Rainfall

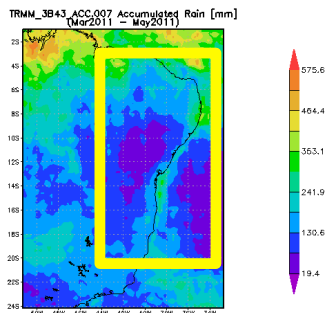
Dec2010-Feb2011



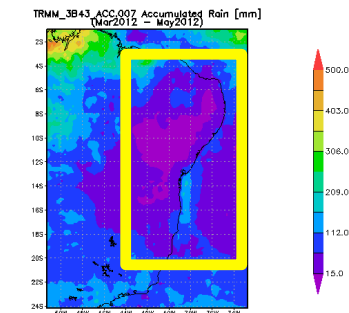
Dec2011-Feb2012



Mar2010-May2011

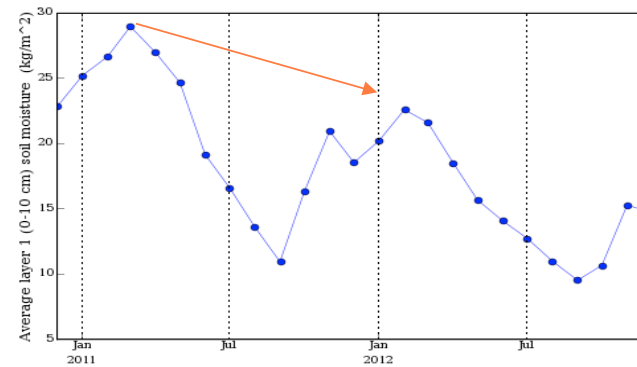


Mar2011-May2012



GLDAS Soil Moisture

Area-Averaged Time Series (GLDAS_NOAH025_M.001)
(Region: 44W-34W, 14S-4S)



- We will examine seasonal and annual variability in accumulated rainfall data products due to its relevance to drought conditions
- Seasonal and annual comparisons temporal range:
- Dec-Feb (2011-2012) and Mar-May (2011-2012)
- In relation to soil moisture (kg/m²) obtained from GLDAS

GIS Data Layers

Rivers/Basins	USGS HydroSHEDS	http://hydrosheds.cr.usgs.gov/
Population	NASA Socioeconomic Data and Applications Center (SEDAC)	http://sedac.ciesin.columbia.edu/
Elevation	Consortium for Spatial Information (CGIAR-CSI)	http://srtm.csi.cgiar.org/
Reservoirs	NASA Socioeconomic Data and Applications Center (SEDAC)	http://sedac.ciesin.columbia.edu/
Soil Type	ISRIC - World Soil Information	http://www.isric.org/
Dams	NASA Socioeconomic Data and Applications Center (SEDAC)	http://sedac.ciesin.columbia.edu/
Agricultural Lands	NASA Socioeconomic Data and Applications Center (SEDAC)	http://sedac.ciesin.columbia.edu/
Land Use	Waterbase	http://www.waterbase.org
Global, National Administrative Areas	Global Administrative Areas	http://www.gadm.org/
Global Base Maps	ESRI Base maps	http://www.esri.com/data/basemaps

Web Tools

TRMM Online Visualization and Analysis System
(TOVAS)

<http://disc.sci.gsfc.nasa.gov/precipitation/tovas>

Giovanni - Interactive Visualization and Analysis

<http://disc.sci.gsfc.nasa.gov/giovanni#instances>

Go to Giovanni, Science Portals, Precipitation: TRMM – TOVAS

TRMM Online Visualization and Analysis System (TOVAS) — GES DISC - Mozilla Firefox

disc.sci.gsfc.nasa.gov/precipitation/tovas

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ALERTS

! IMPORTANT: Rollback and Replacement of TRMM VIRS Data Products for May 12, 2013 (DOY 132)

You are here: [GES DISC Home](#) » [Precipitation](#) » TRMM Online Visualization and Analysis System (TOVAS)

TRMM Online Visualization and Analysis System (TOVAS)

! IMPORTANT MESSAGE May 14, 2013 IMPORTANT: Rollback and Replacement of TRMM VIRS Data Products for May 12, 2013 (DOY 132)

From PPS:

PPS was informed by PACOR after TRMM data production for May 12, 2013 had finished and products were made available, that there was missing data in the level zero VIRS file for that day (DOY 132). A replacement version with the recovered data was made available and PPS used this improved version to generate replacement files.

If you have obtained any 1A01 and downstream TRMM data products earlier today (see list below) through our data archive or via Standing Order, etc., please discard these products and use the newer replacement file versions. The replacement files should have a time stamp of approx 19:16 etc.

TRMM data replaced for May 12, 2013 include the following:

1A01, 1B01, 1B01BR, 1B01QA, 1B01_C, 1B01_TREND, 3G01-4, 3G01-5, EGscan, FireMonth, FireDay, FireDayPlot, FireMonthPlot, UtahDay, UtahZ

If you have questions or concerns, please contact us, gsfc-help-disc@lists.nasa.gov

Welcome to TOVAS, a member of the Giovanni (GES DISC Interactive Online Visualization and Analysis Infrastructure) family, which provides users with an easy-to-use, Web-based interface for the visualization and analysis of global precipitation data.

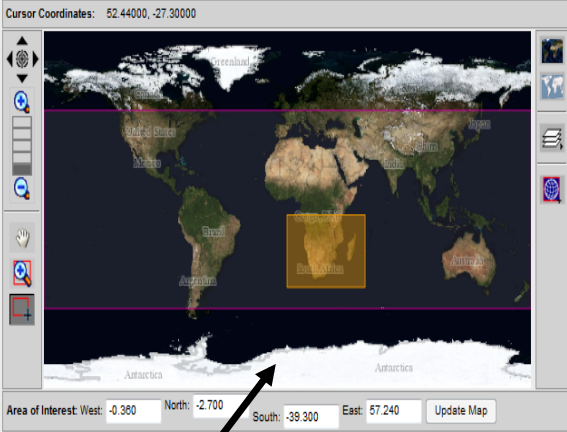
Satellite Rainfall Archives:
Monthly TRMM and Other Data Sources Rainfall Estimate (3B43, 3A12, 3A25 V7)

Giovanni - TRMM 3B43

select

Spatial

Cursor Coordinates: 52.44000, -27.30000



Area of Interest: West: -0.360 North: -2.700 South: -39.300 East: 57.240 Update Map

Vertical Profile

Select a vertical profile range. The range selection is disabled unless a qualifying parameter is selected. In order to enable this option (and populate the list with values), select a 3D parameter. 3D are labeled with a '(3D)' in the 'Parameters' section.

LIMPOPO RIVER BASIN

TRMM 3B43 V7

Choose accumulated rain and rain rate

Parameter	Data Product Info	TRMM	1997/12 - 2013/10
<input type="checkbox"/> Conv Rain Pixel Count (0.5x0.5 deg)	TRMM_3A25.007	TRMM	1997/12 - 2013/10
<input type="checkbox"/> Conv Rain Pixel Count (5.0x5.0 deg)	TRMM_3A25.007	TRMM	1997/12 - 2013/10
<input type="checkbox"/> Rain Pixel Count (0.5x0.5 deg)	TRMM_3A25.007	TRMM	1997/12 - 2013/10
<input type="checkbox"/> Rain Pixel Count (5.0x5.0 deg)	TRMM_3A25.007	TRMM	1997/12 - 2013/10
<input type="checkbox"/> Chk Mean Rain Rate (0.5x0.5 deg)	TRMM_3A25.007	TRMM	1997/12 - 2013/10
TRMM 3B43 V7(1998/01/01 - 2013/08/31)			
<input checked="" type="checkbox"/> Accumulated Rain	TRMM_3B43_ACC.007	TRMM	1998/01 - 2013/07
<input checked="" type="checkbox"/> Rain Rate	TRMM_3B43.007	TRMM	1998/01 - 2013/08
<input type="checkbox"/> Relative Error	TRMM_3B43.007	TRMM	1998/01 - 2013/08
TRMM 3A11 V7(1997/12/01 - 2013/10/31)			
<input type="checkbox"/> Accumulated Precipitation	TRMM_3A11.007	TRMM	1997/12 - 2013/10
TRMM 3B31 V7(1997/12/01 - 2013/10/31)			
<input type="checkbox"/> Accumulated TMI Convective Surface Precipitation	TRMM_3B31.007	TRMM	1997/12 - 2013/10
<input type="checkbox"/> Accumulated TMI Surface Precipitation	TRMM_3B31.007	TRMM	1997/12 - 2013/10

Temporal

Begin Date Year 2011 Month Dec

End Date Year 2013 Month Feb

Note: The products are monthly

Select Visualization:

Lat-Lon map, Time-averaged Edit Preferences Visualization Help

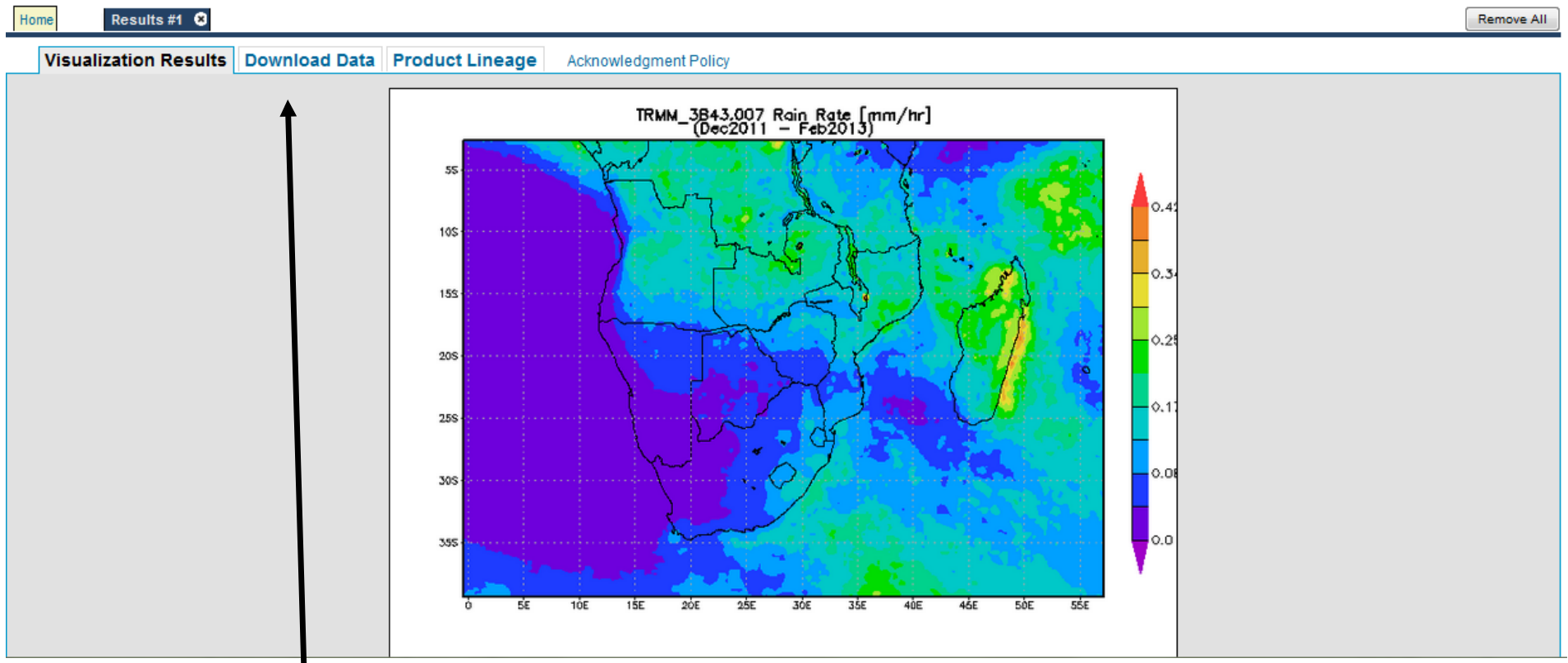
Generate Visualization Reset

Select region and time frame.

Generate Visualization as Lat-Lon map, time-averaged.

Visualization Results

TRMM Level-3 Monthly Products.



Open the Download Data tab.

Download NetCDF Files

TRMM Online Visualization and Analysis System (TOVAS) TRMM Level-3 Monthly Products.

Home Results #1 Remove All

Visualization Results **Download Data** Product Lineage Acknowledgment Policy

Download source data products and data products derived from Giovanni processing stages. For simplicity purposes, only the initial retrieval and final rendering phases are currently accessible for downloading. Supported download formats are HDF, NetCDF(NCD), ASCII, and KMZ (ASCII is available only when the array size is within about half-million points). To **download multiple files** at once, select the desired files (from any section) by clicking on their associated checkboxes, and then click 'Download in Batch'. **Note:** that 'n/a' means that a file size or other column value is not available; 'saa' means that a file is exactly the same as the previous one in the list. Also, not all services and data products support all download file formats.

Initial Data Retrieval

Data Product	Start Time	File Size (b)	
TRMM_3B43.007 (precipitation)	2011-12-01T00:00:00Z	3885738	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
TRMM_3B43.007 (precipitation)	2012-01-01T00:00:00Z	3889404	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
TRMM_3B43.007 (precipitation)	2012-02-01T00:00:00Z	3897999	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
TRMM_3B43.007 (precipitation)	2012-03-01T00:00:00Z	3904667	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
TRMM_3B43.007 (precipitation)	2012-04-01T00:00:00Z	3916273	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>

Download in Batch

Two Dimensional Map Plot

Input Files	Start Time	File Size (b)	
TRMM_3B43.007 (precipitation)	2011-12-01T00:00:00Z	141695	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>


Download in Batch

Check the NCD and Download in Batch

Downloaded zip file. Click link to save file to desired location.

gdata1.sci.gsfc.nasa.gov/daac-bin/G3/batchDownload.cgi

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Giovanni - The Bridge Between Data and Science

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Batch Download

All of your selected files have been compressed into one single file. Please click the file name below to download:

File: [TRMM_Monthly_latlonplot_113103182236.tar.gz](#)

Size: 83089.4 KB

Please click [here](#) to go back to make another download, or click the "Back" button on the browser.

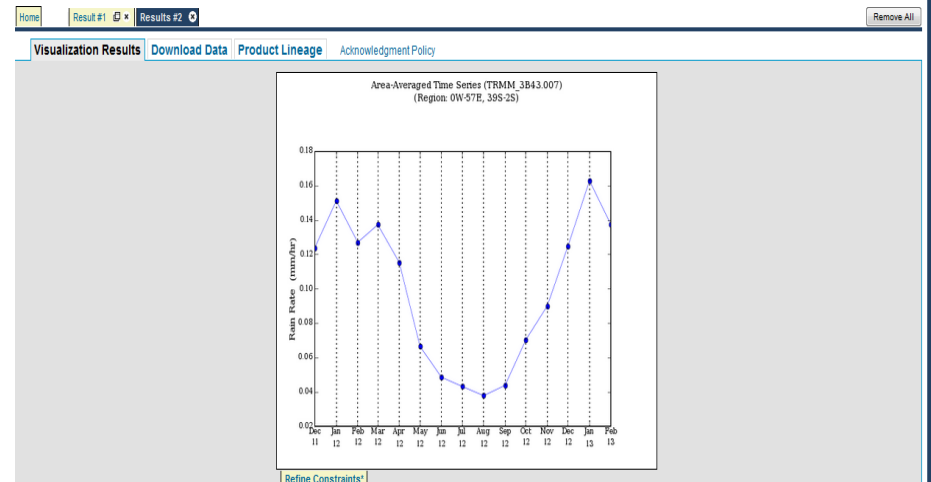
 Responsible NASA Official: Steven.J.Kempler@nasa.gov
Web Curator: [M. Hegde \(gsfc-giovanni-dsc@lists.nasa.gov\)](mailto:M.Hegde@gsfc-giovanni-dsc@lists.nasa.gov)

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time series plots

TRMM Online Visualization and Analysis System (TOVAS)
TRMM Level-3 Monthly Products.



Animation visualization

<input type="checkbox"/>	Strat Mean Rain Rate (0.5x0.5 deg)	TRMM_3A25.007	TRMM	1997/12 - 2013/10
<input type="checkbox"/>	Strat Mean Rain Rate (5.0x5.0 deg)	TRMM_3A25.007	TRMM	1997/12 - 2013/10
<input type="checkbox"/>	Strat Rain Pixel Count (0.5x0.5 deg)	TRMM_3A25.007	TRMM	1997/12 - 2013/10
<input type="checkbox"/>	Strat Rain Pixel Count (5.0x5.0 deg)	TRMM_3A25.007	TRMM	1997/12 - 2013/10

☐ TRMM 3B43 V7(1998/01/01 - 2013/08/31)

Parameter	Data Product Info		
<input checked="" type="checkbox"/> Accumulated Rain	TRMM_3B43_ACC.007	TRMM	1998/01 - 2013/07
<input checked="" type="checkbox"/> Rain Rate	TRMM_3B43.007	TRMM	1998/01 - 2013/08
<input type="checkbox"/> Relative Error	TRMM_3B43.007	TRMM	1998/01 - 2013/08

☐ TRMM 3A11 V7(1997/12/01 - 2013/10/31)

Parameter	Data Product Info		
<input type="checkbox"/> Accumulated Precipitation	TRMM_3A11.007	TRMM	1997/12 - 2013/10

☐ TRMM 3B31 V7(1997/12/01 - 2013/10/31)

Parameter	Data Product Info		
<input type="checkbox"/> Accumulated TMI Convective Surface Precipitation	TRMM_3B31.007	TRMM	1997/12 - 2013/10
<input type="checkbox"/> Precipitation	TRMM_3B31.007	TRMM	1997/12 - 2013/10

Time series
 Vertical Profile
 Scatter plot, Time-averaged
 Longitude-Time Hovmöller Diagram
 Cross Map, Time-Pressure
 Latitude-Time Hovmöller Diagram
 Cross Map, Latitude-Pressure
 Time series, Area statistics
 Lat-Lon map, Time-accumulated
 Cross Map, Longitude-Pressure
 Overlay of Lat-Lon Maps

☒ Animation
 Lat-Lon map, Time-averaged
 Time series

Begin Date Year 2011 Month Dec
 End Date Year 2013 Month Feb

[Edit Preferences](#)
[Visualization Help](#)

[Generate Visualization](#)
[Reset](#)

[Home](#)
[Result #1](#)
[Result #2](#)
[Results #3](#)

[Remove All](#)

[Visualization Results](#)
[Download Data](#)
[Product Lineage](#)
[Acknowledgment Policy](#)

TRMM_3B43.007 Rain Rate [mm/hr]
 (Dec2011)

0.9
0.75
0.5
0.35
0.15
0.0

0 5E 10E 15E 20E 25E 30E 35E 40E 45E 50E 55E

0 5S 10S 15S 20S 25S 28S 30S 35S

Play Once Jump To: 0 Speed:

If animation does not work immediately in your browser you can still view the image one at a time by clicking on the or button.

GLDAS products from the four land surface models: Mosaic, Noah, CLM (Community Land Model), and VIC (Variable Infiltration Capacity), can be accessed through Giovanni.

Giovanni:
<http://disc.sci.gsfc.nasa.gov/giovanni>

The screenshot displays the Giovanni website interface. At the top, there are navigation tabs: "GES DISC Home", "Data Services", "Science Portals", and "Mission Portals". Below these are links: "Analyze Data with Giovanni", "Search for Data with Mirador", "Simple Subset Wizard", "Data Cookbook", and "More...". A banner features the text "Giovanni - The Bridge Between Data and Science" over a collage of satellite images. The main content area includes a sidebar on the left with "OVERVIEW" and "Additional Features" sections. The central part shows the breadcrumb "You are here: GES DISC Home » Giovanni - Interactive Visualization and Analysis" and the title "Giovanni - Interactive Visualization and Analysis". A yellow box highlights "Giovanni-4 Now Available". Below this is a "Giovanni Portals" section with a "Giovanni Parameter List" tab. The list includes "Atmospheric Portals", "Application and Education Portal", "Meteorological Portals", "Ocean Portals", and "Hydrology Portals". Under "Hydrology Portals", the "GLDAS" section lists "Global Land Data Assimilation System 1° x 1° Monthly Data", "Global Land Data Assimilation System 1° x 1° 3-Hourly Data", and "New! Global Land Data Assimilation System 0.25° x 0.25° Monthly Data". A right sidebar titled "GIOVANNI NEWS" lists recent updates and publications.

GES DISC Home Data Services Science Portals Mission Portals

Analyze Data with Giovanni Search for Data with Mirador Simple Subset Wizard Data Cookbook More...

Giovanni - The Bridge Between Data and Science

» OVERVIEW

- + What is Giovanni?
- + Who Uses Giovanni?
- + Giovanni Parameters
- + Giovanni Plot Types
- + How to Use Giovanni
- + How to Acknowledge Giovanni
- + Acknowledgements

Additional Features

- + News
- + Users Manual
- + Publications
- + Newsletters
- + Feedback
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Giovanni - Interactive Visualization and Analysis

Contributors: tonyr, rchowdhury

Giovanni - Interactive Visualization and Analysis - GES DISC: Goddard Earth Sciences, Data and Information Services Center

Giovanni-4 Now Available
New! Please try out [Giovanni-4](#), the next generation of Giovanni, with dramatically improved performance and interactive plotting and mapping. (Currently, only select Aerosols, Hydrology and Turbulent Flux data are available in Giovanni-4, with more on the way.)

Giovanni Portals Giovanni Parameter List

- ▶ Atmospheric Portals (Scroll down to view complete list)
- ▶ Application and Education Portal (Scroll down to view complete list)
- ▶ Meteorological Portals
- ▶ Ocean Portals
- ▼ Hydrology Portals (Scroll down to view complete list)
 - TRMM Online Visualization and Analysis System (TOVAS)
 - GLDAS
 - Global Land Data Assimilation System 1° x 1° Monthly Data
 - Global Land Data Assimilation System 1° x 1° 3-Hourly Data
 - **New!** Global Land Data Assimilation System 0.25° x 0.25° Monthly Data
 - Global Land Data Assimilation System 0.25° x 0.25° 3-Hourly Data

GIOVANNI NEWS

MODIS observes progressive development of air pollution crisis in China
Oct 25, 2013

Staff from the GES DISC participate in NSF EarthCube Workshop
Oct 21, 2013

Newest additions to Giovanni publications list
Sep 30, 2013

September 2013 issue of The Giovanni News is online
Sep 27, 2013

Humberto: Hurricane today, gone tomorrow?
Sep 10, 2013

August 2013 issue of The Giovanni News is online
Aug 23, 2013

GES DISC contributes to Agro-GeoInformatics 2013
Aug 12, 2013

Observing Arizona's Yarnell Hill fire with OMI and MODIS
Aug 09, 2013

Global Land Data Assimilation System 0.25° x 0.25° Monthly Data

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Global Land Data Assimilation System (GLDAS)

0.25 Degree Monthly Products

Home Remove All

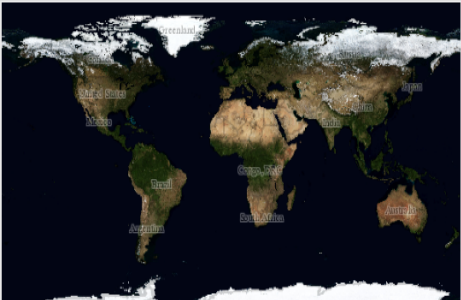
The Global Land Data Assimilation System (GLDAS) is generating a series of land surface forcing (e.g. precipitation, surface meteorology and radiation), state (e.g., soil moisture and temperature, and snow), and flux (e.g., evaporation and sensible heat flux) data simulated by land surface models.

Current GLDAS data holdings include a set of GLDAS Version 1 (GLDAS-1) 1.0 degree resolution data (1979 - present) from CLM, Mosaic, Noah, and VIC models; a set of GLDAS Version 2 (GLDAS-2) 1.0 degree resolution data (1948 - 2008) from CLM, Catchments, Noah, and VIC models; a set of 0.25 degree resolution data from GLDAS-1 Noah model (2000 - present) and GLDAS-2 Noah model (1948 - 2008). This instance focuses on GLDAS-1 0.25 degree monthly data. GLDAS-2 0.25 degree data will be added in once the data become available.

Select:

Spatial

Cursor Coordinates: -89.36000, -8.06000

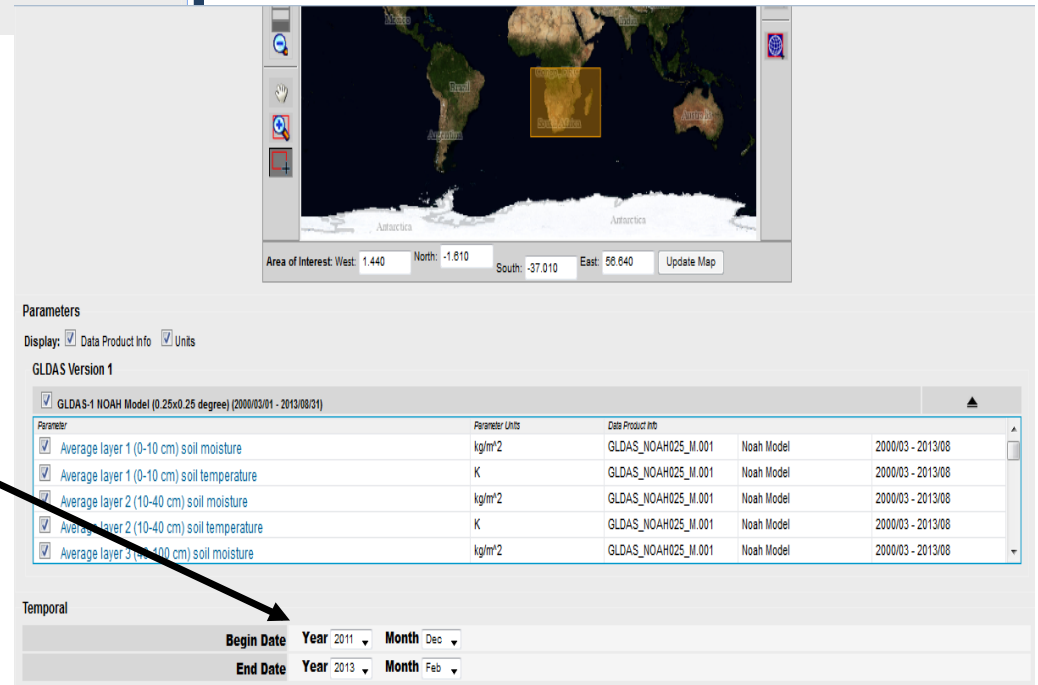


Global Land Data Assimilation System (GLDAS)

- 0.25 Degree Monthly Products

Select region and time frame.

Generate Visualization as Lat-Lon map, time-averaged.



Area of Interest: West: 1.440 North: -1.610 South: -37.010 East: 56.640 Update Map

Parameters

Display: ☒ Data Product Info ☒ Units

GLDAS Version 1

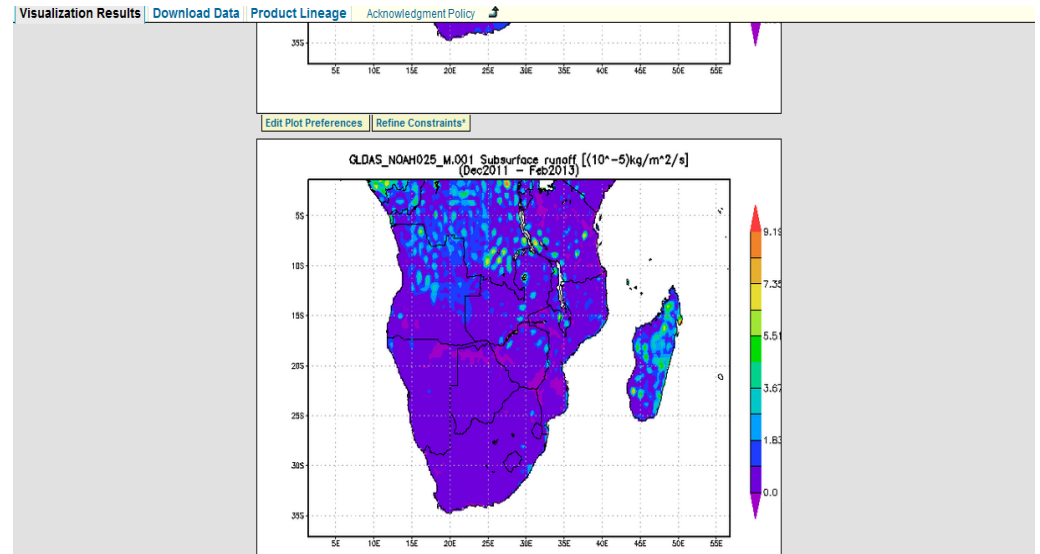
Parameter	Parameter Units	Data Product Info
<input checked="" type="checkbox"/> Average layer 1 (0-10 cm) soil moisture	kg/m ²	GLDAS_NOAH025_M.001 Noah Model 2000/03 - 2013/08
<input checked="" type="checkbox"/> Average layer 1 (0-10 cm) soil temperature	K	GLDAS_NOAH025_M.001 Noah Model 2000/03 - 2013/08
<input checked="" type="checkbox"/> Average layer 2 (10-40 cm) soil moisture	kg/m ²	GLDAS_NOAH025_M.001 Noah Model 2000/03 - 2013/08
<input checked="" type="checkbox"/> Average layer 2 (10-40 cm) soil temperature	K	GLDAS_NOAH025_M.001 Noah Model 2000/03 - 2013/08
<input checked="" type="checkbox"/> Average layer 3 (40-100 cm) soil moisture	kg/m ²	GLDAS_NOAH025_M.001 Noah Model 2000/03 - 2013/08

Temporal

Begin Date Year 2011 Month Dec

End Date Year 2013 Month Feb

Similar to the TRMM data routine, after the visualization has been generated, download the data. If there are many files, a batch download is available in a zipped file format.



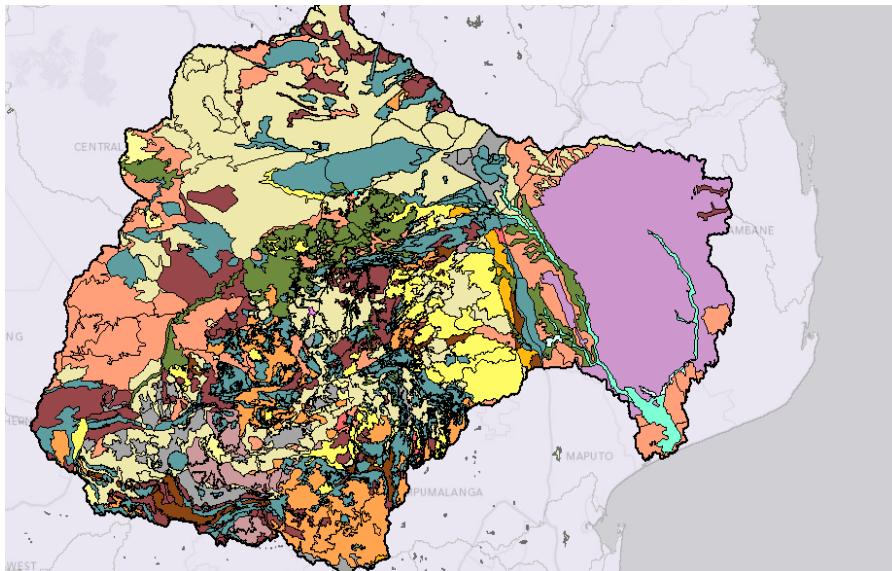
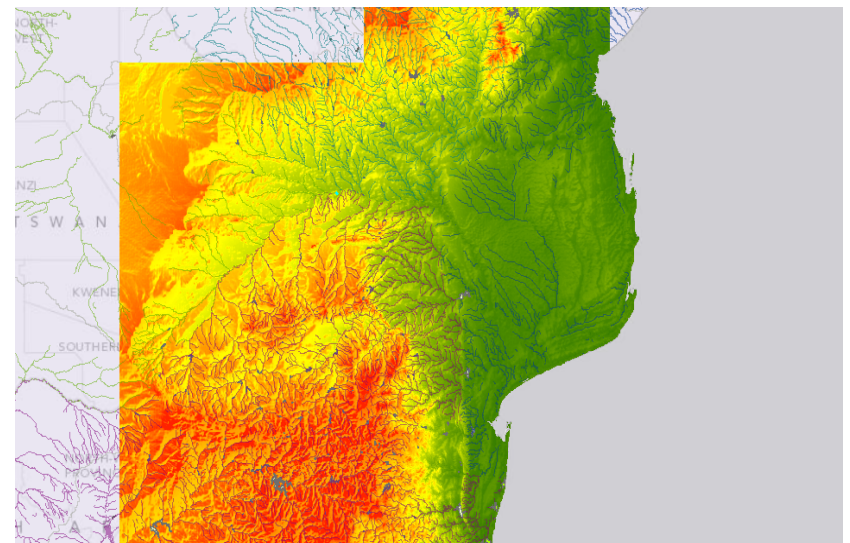
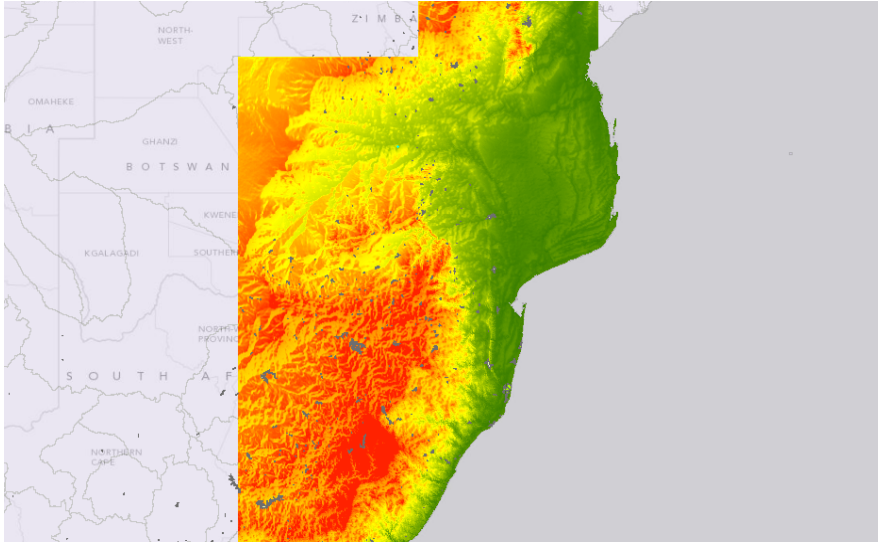
Home Results #1 Remove All

Visualization Results **Download Data** Product Lineage Acknowledgment Policy

Download source data products and data products derived from Giovanni processing stages. For simplicity purposes, only the initial retrieval and final rendering phases are currently accessible for downloading. Supported download formats are HDF, NetCDF(NCD), ASCII, and KMZ (ASCII is available only when the array size is within about half-million points). To **download multiple files** at once, select the desired files (from any section) by clicking on their associated checkboxes, and then click 'Download in Batch'. **Note:** that 'n/a' means that a file size or other column value is not available; 'saa' means that a file is exactly the same as the previous one in the list. Also, not all services and data products support all download file formats.

Initial Data Retrieval			
Data Product	Start Time	File Size (b)	Download Files
GLDAS_NOAH025_M.001 (soilm1)	2011-12-01T00:00:00Z	18092281	<input type="checkbox"/> HDF <input checked="" type="checkbox"/> NCD <input type="checkbox"/> ASC
GLDAS_NOAH025_M.001 (soilm1)	2011-12-01T00:00:00Z	18092281	saa saa
GLDAS_NOAH025_M.001 (soilm2)	2011-12-01T00:00:00Z	18092281	saa saa
GLDAS_NOAH025_M.001 (soilm2)	2011-12-01T00:00:00Z	18092281	saa saa
GLDAS_NOAH025_M.001 (soilm3)	2011-12-01T00:00:00Z	18092281	saa saa
GLDAS_NOAH025_M.001 (soilm3)	2011-12-01T00:00:00Z	18092281	saa saa
GLDAS_NOAH025_M.001 (soilm4)	2011-12-01T00:00:00Z	18092281	saa saa
GLDAS_NOAH025_M.001 (soilm4)	2011-12-01T00:00:00Z	18092281	saa saa
Download in Batch			
Two Dimensional Map Plot			
Input Files	Start Time	File Size (b)	Download Files
GLDAS_NOAH025_M.001 (canopint)	2011-12-01T00:00:00Z	3619925	<input type="checkbox"/> HDF <input type="checkbox"/> NCD <input checked="" type="checkbox"/> ASC
GLDAS_NOAH025_M.001 (tsair)	2011-12-01T00:00:00Z	3619925	saa saa <input checked="" type="checkbox"/> ASC
GLDAS_NOAH025_M.001 (qsair)	2011-12-01T00:00:00Z	3619925	saa saa <input checked="" type="checkbox"/> ASC
GLDAS_NOAH025_M.001 (lwdownd)	2011-12-01T00:00:00Z	3619925	saa saa <input checked="" type="checkbox"/> NCD

ESRI – ArcMap – Limpopo River Basin



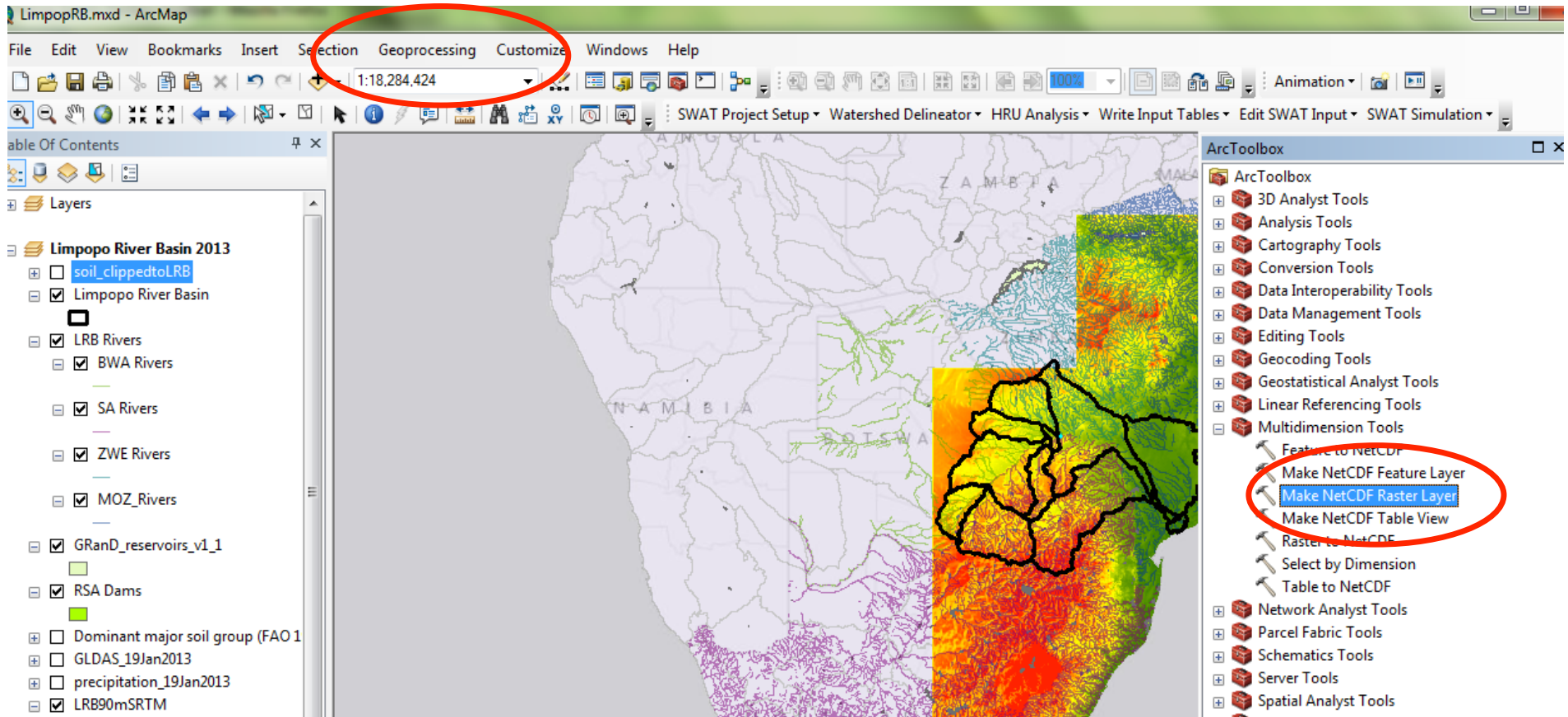
Relavant data layers

- STRM elevation data
- Rivers
- Hydrological Units
- Soil type
- population data
- Land Use/ Land Cover
- Infrastructure

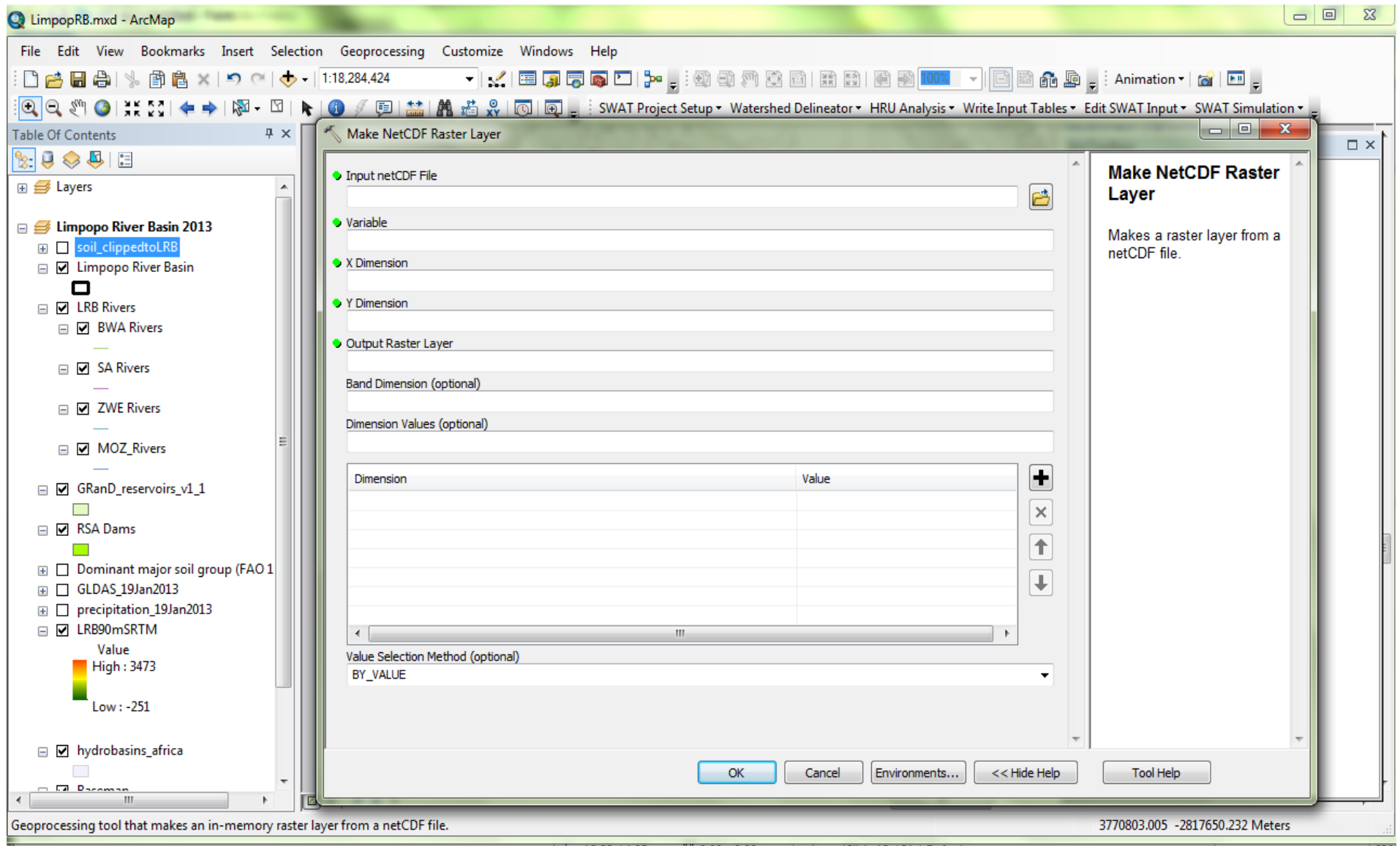
GIS Data Layers

Rivers/Basins	USGS HydroSHEDS	http://hydrosheds.cr.usgs.gov/
Population	NASA Socioeconomic Data and Applications Center (SEDAC)	http://sedac.ciesin.columbia.edu/
Elevation	Consortium for Spatial Information (CGIAR-CSI)	http://srtm.csi.cgiar.org/
Reservoirs	NASA Socioeconomic Data and Applications Center (SEDAC)	http://sedac.ciesin.columbia.edu/
Soil Type	ISRIC - World Soil Information	http://www.isric.org/
Dams	NASA Socioeconomic Data and Applications Center (SEDAC)	http://sedac.ciesin.columbia.edu/
Agricultural Lands	NASA Socioeconomic Data and Applications Center (SEDAC)	http://sedac.ciesin.columbia.edu/
Land Use	Waterbase	http://www.waterbase.org
Global, National Administrative Areas	Global Administrative Areas	http://www.gadm.org/
Global Base Maps	ESRI Base maps	http://www.esri.com/data/basemaps

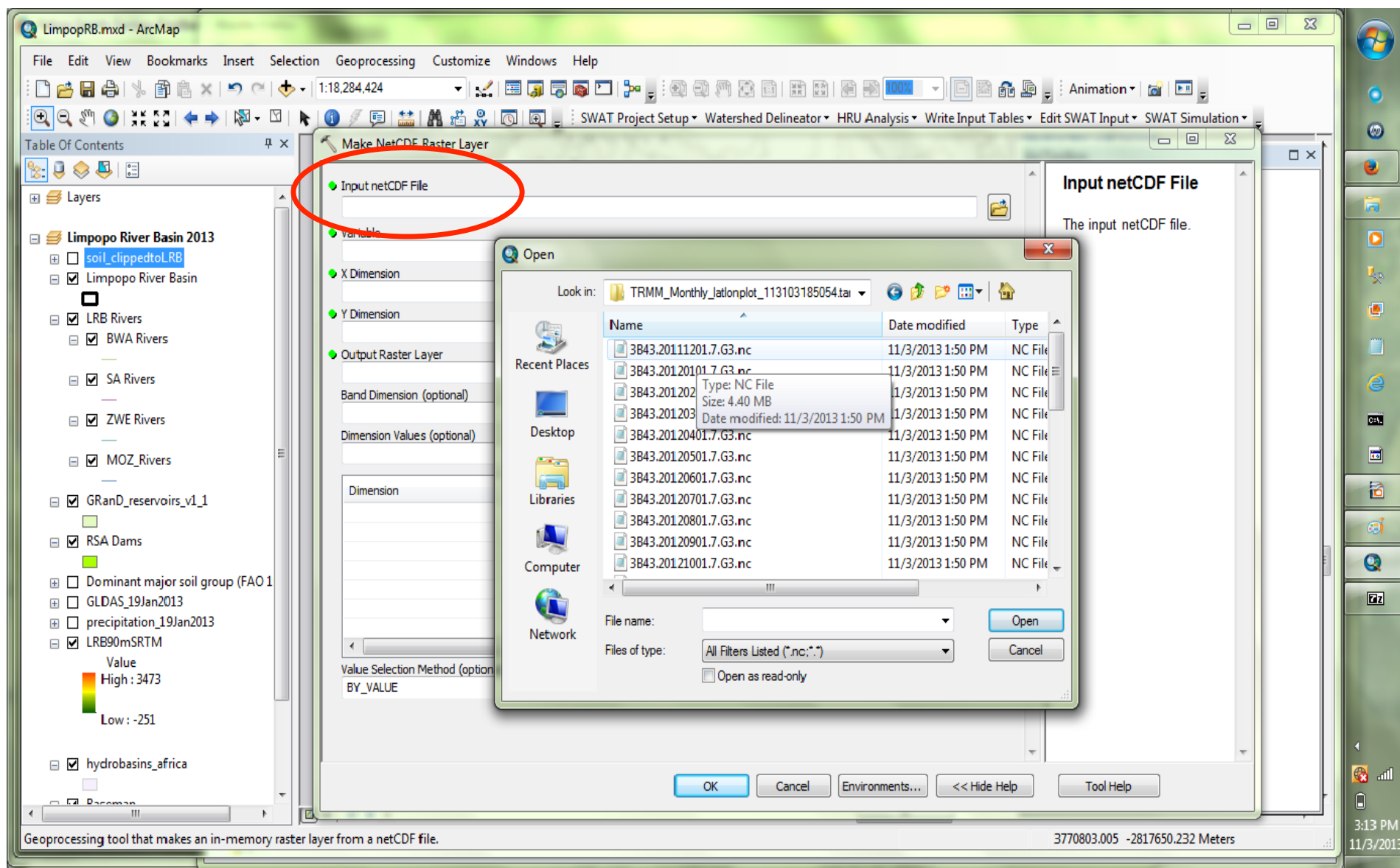
Import TRMM Data



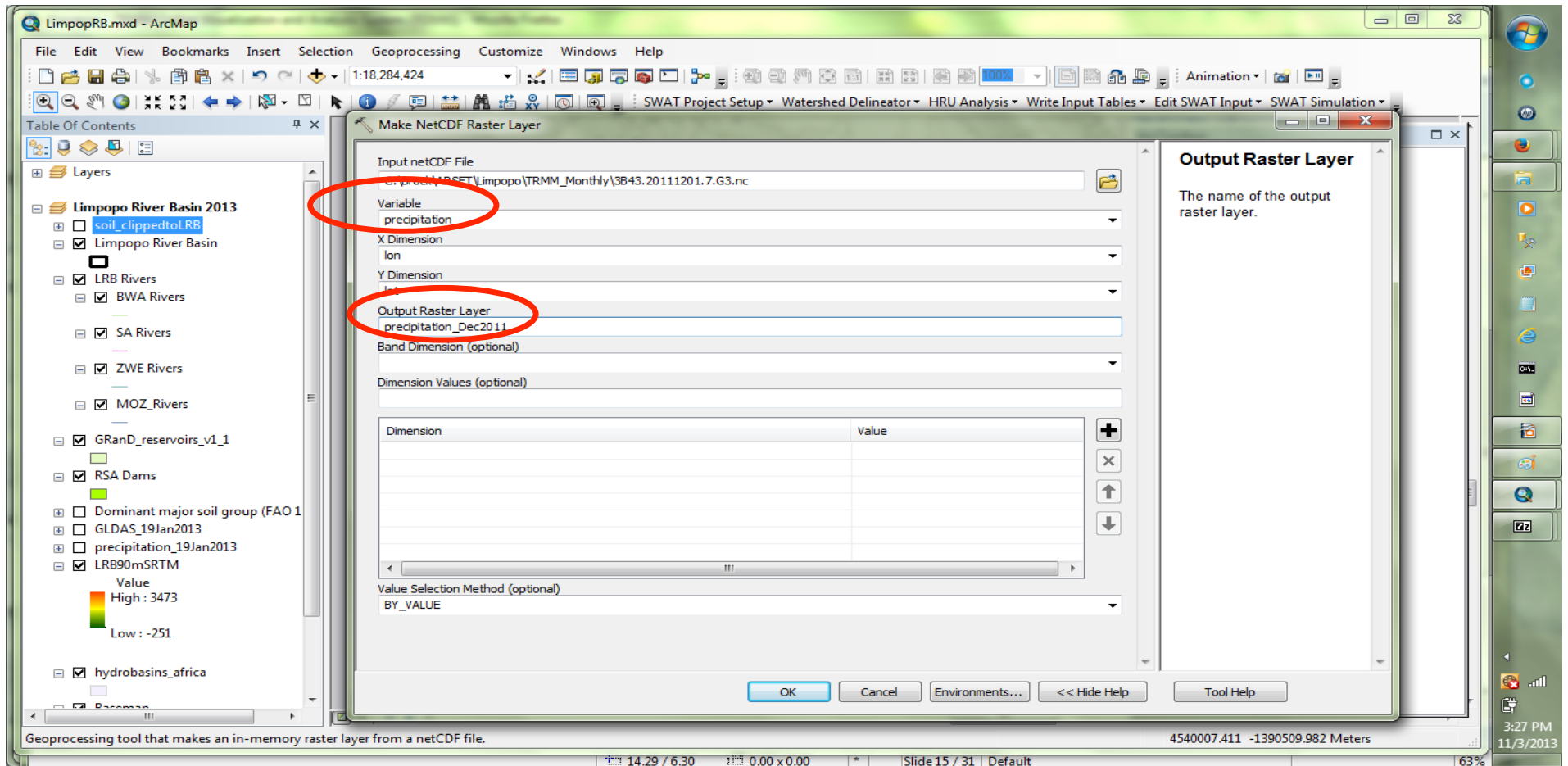
Under the Geoprocessing Tab, Open the ArcToolbox. Open the Multidimensional toolbox, choose the Make NetCDF Raster Layer tool



Make netCDF Raster Layer tool



Select your netCDF file for the Input netCDF File value

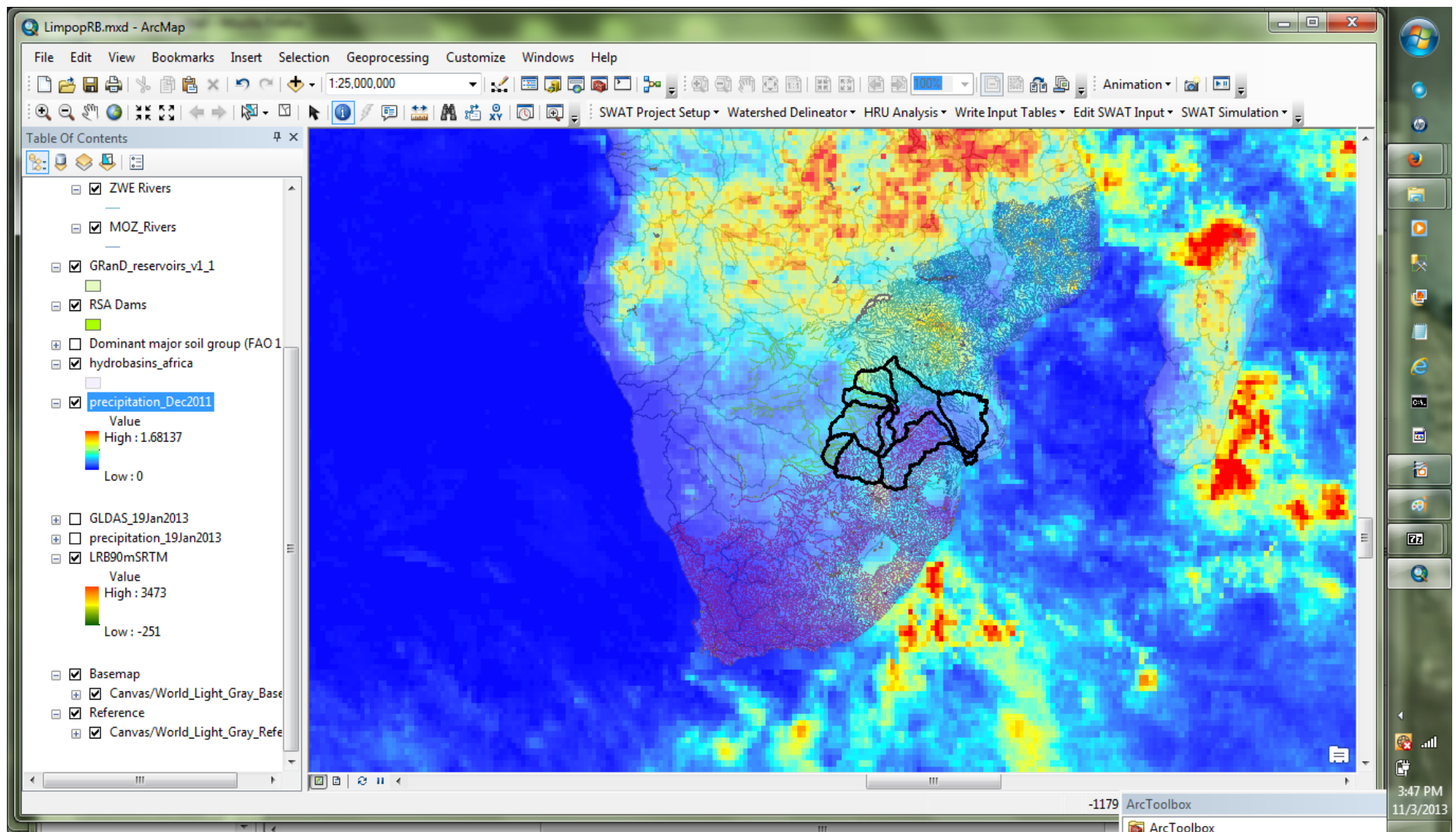


In the Variable field, under the dropdown menu, choose accumulated precipitation.

For the X Dimension field, choose longitude (lon). For the Y Dimension field, choose longitude (lat). These are the defaults settings.

For the Output Raster Layer, type an appropriate name for the resulting raster file to be created. The date, time and variable being displayed is suggested.

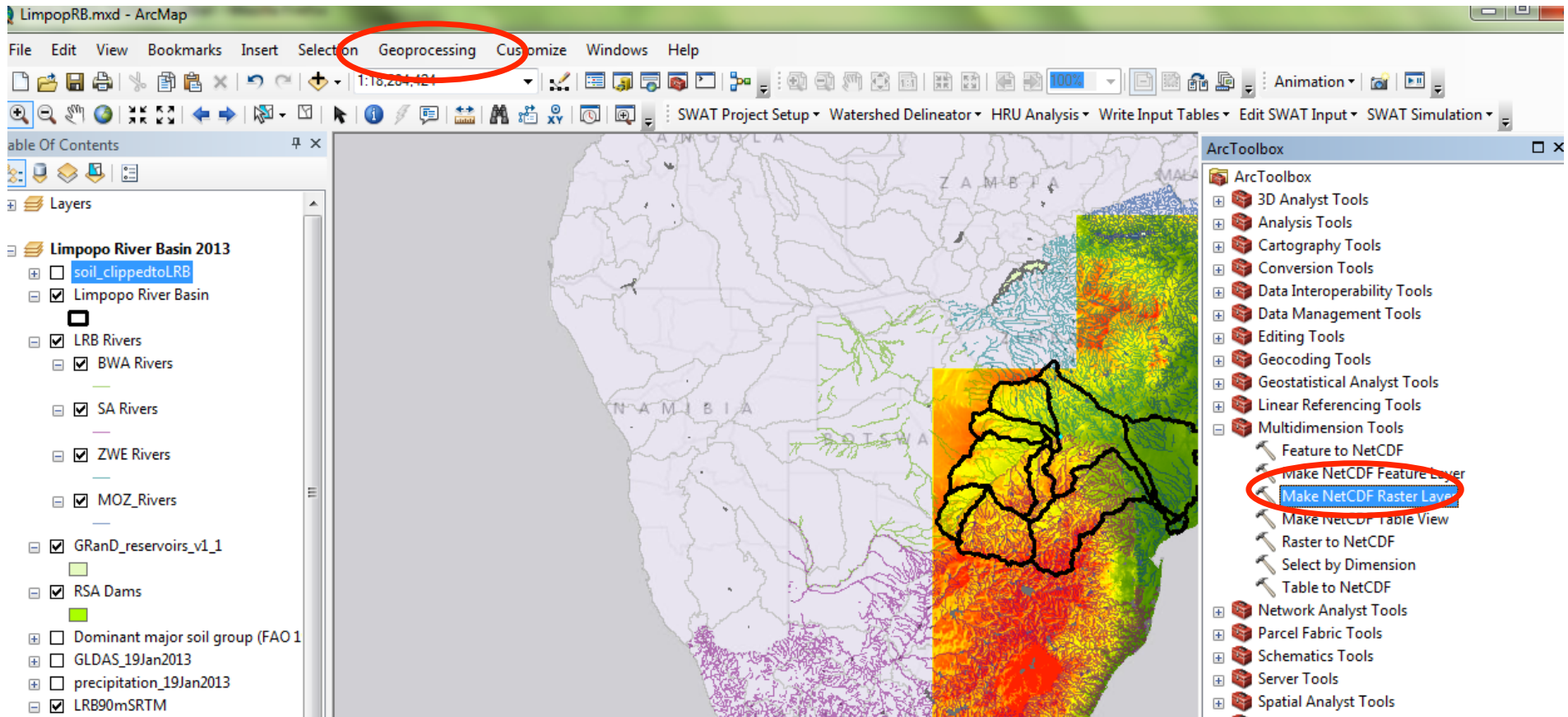
Click ok.



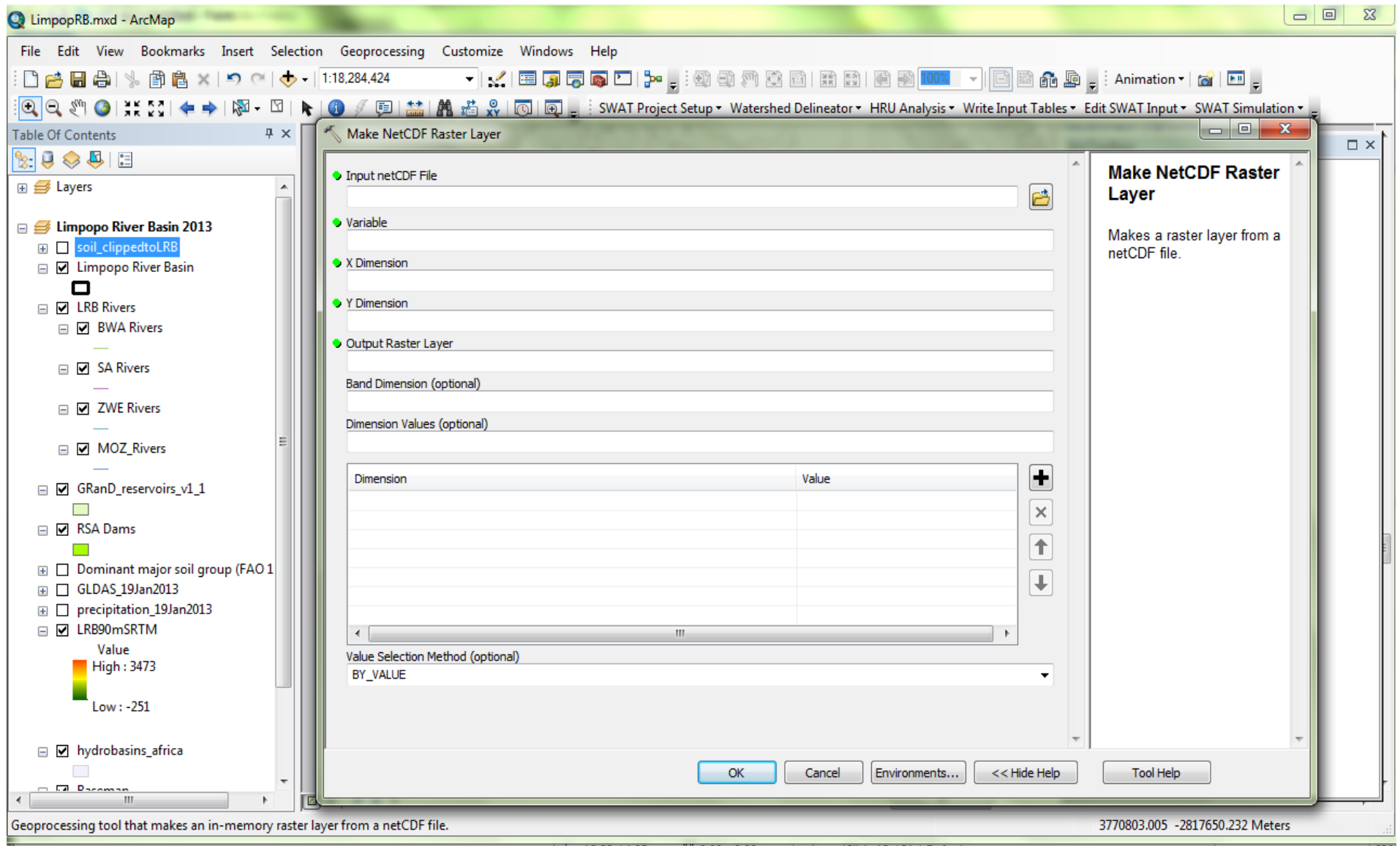
Importation Results

Repeat this routine all monthly TRMM precipitation and Accumulated precipitation netCDF files.

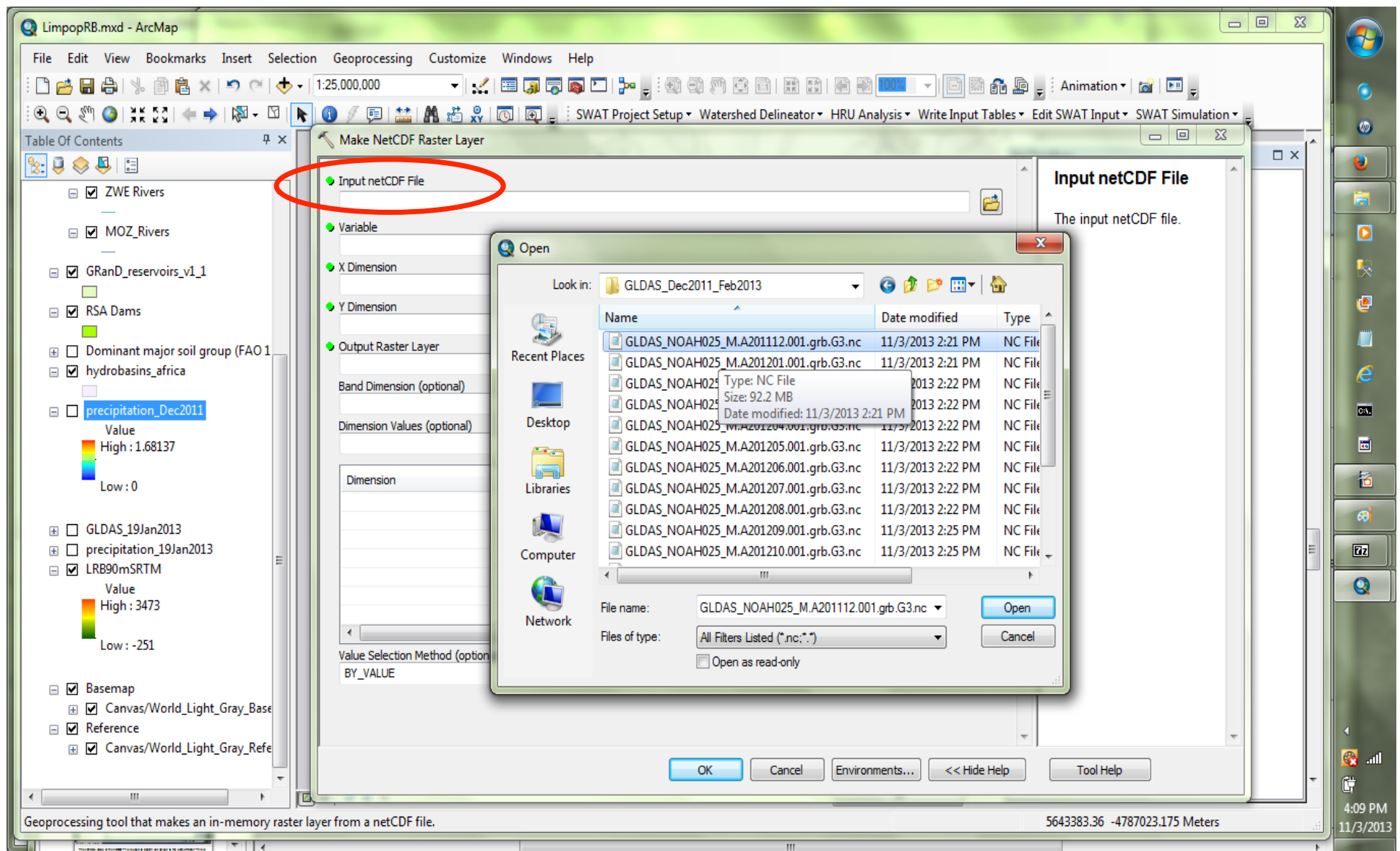
Import GLDAS Data



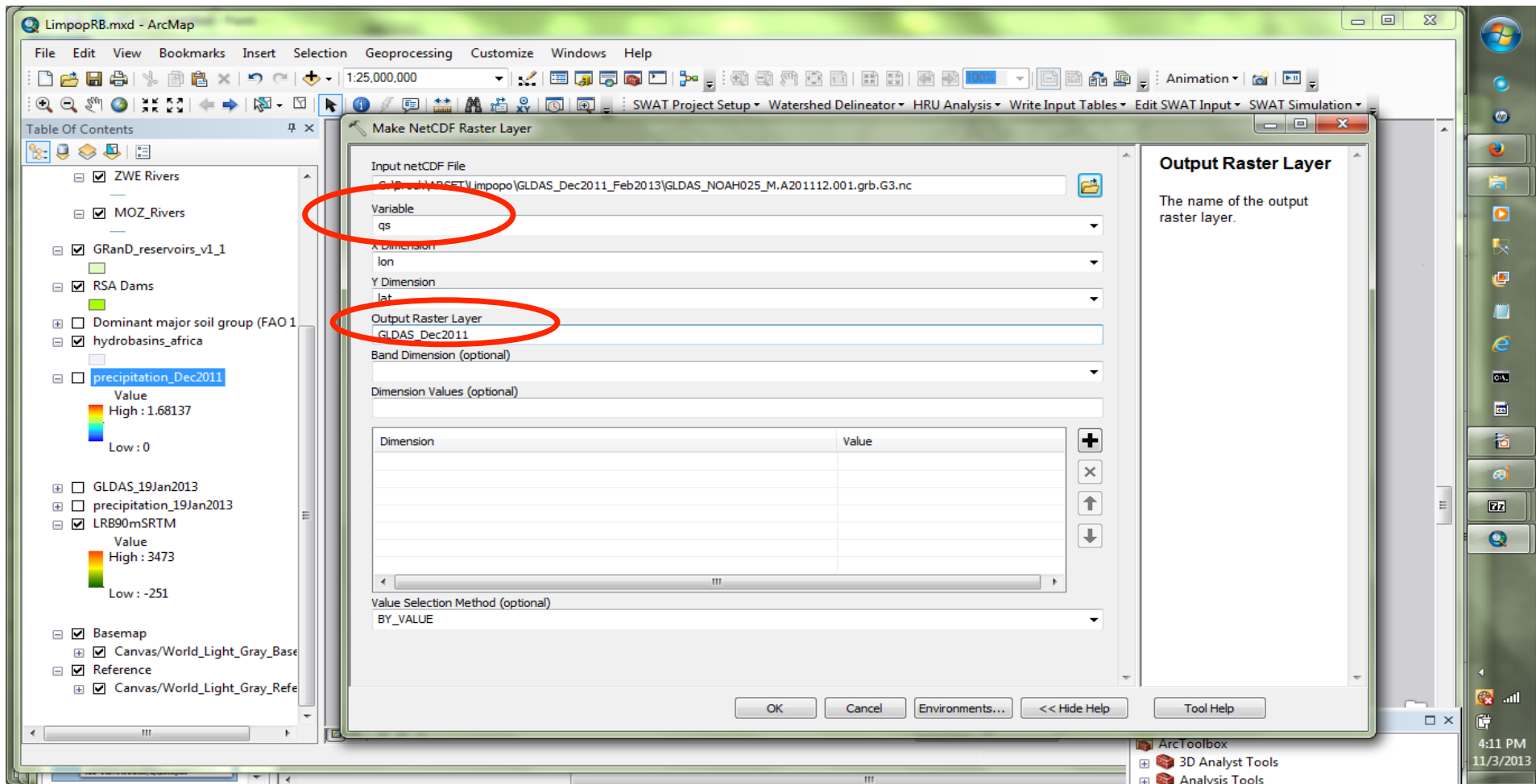
Under the Geoprocessing Tab, Open the ArcToolbox. Open the Multidimensional toolbox, choose the Make NetCDF Raster Layer tool



Make netCDF Raster Layer tool



Select your netCDF file for the Input netCDF File value

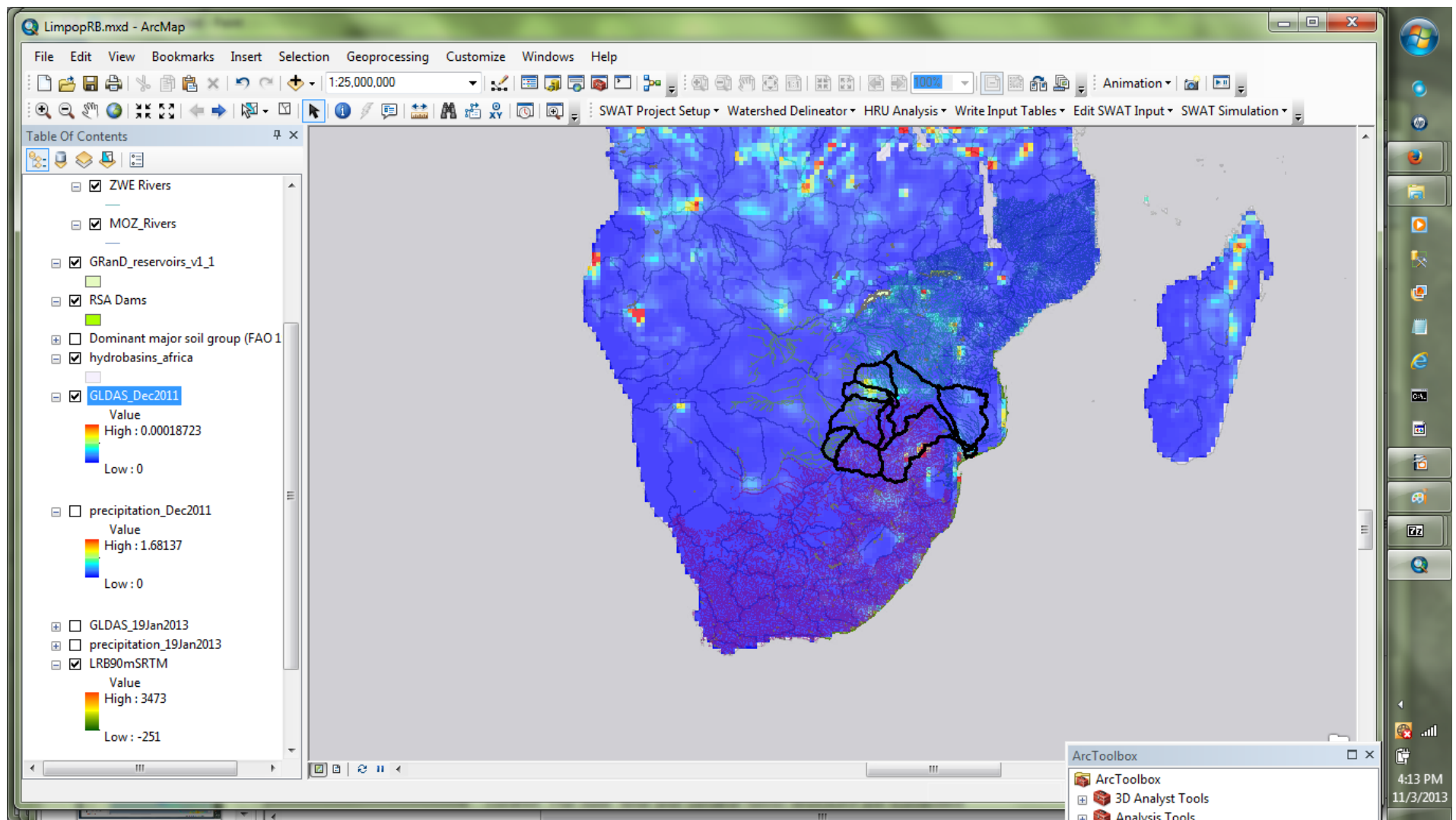


The variable value of the netCDF file is used to assign cell values to the output raster. This is the variable that will be displayed. Choose your initial variable of interest. Upon import, however, all variables are included in the netCDF layer.

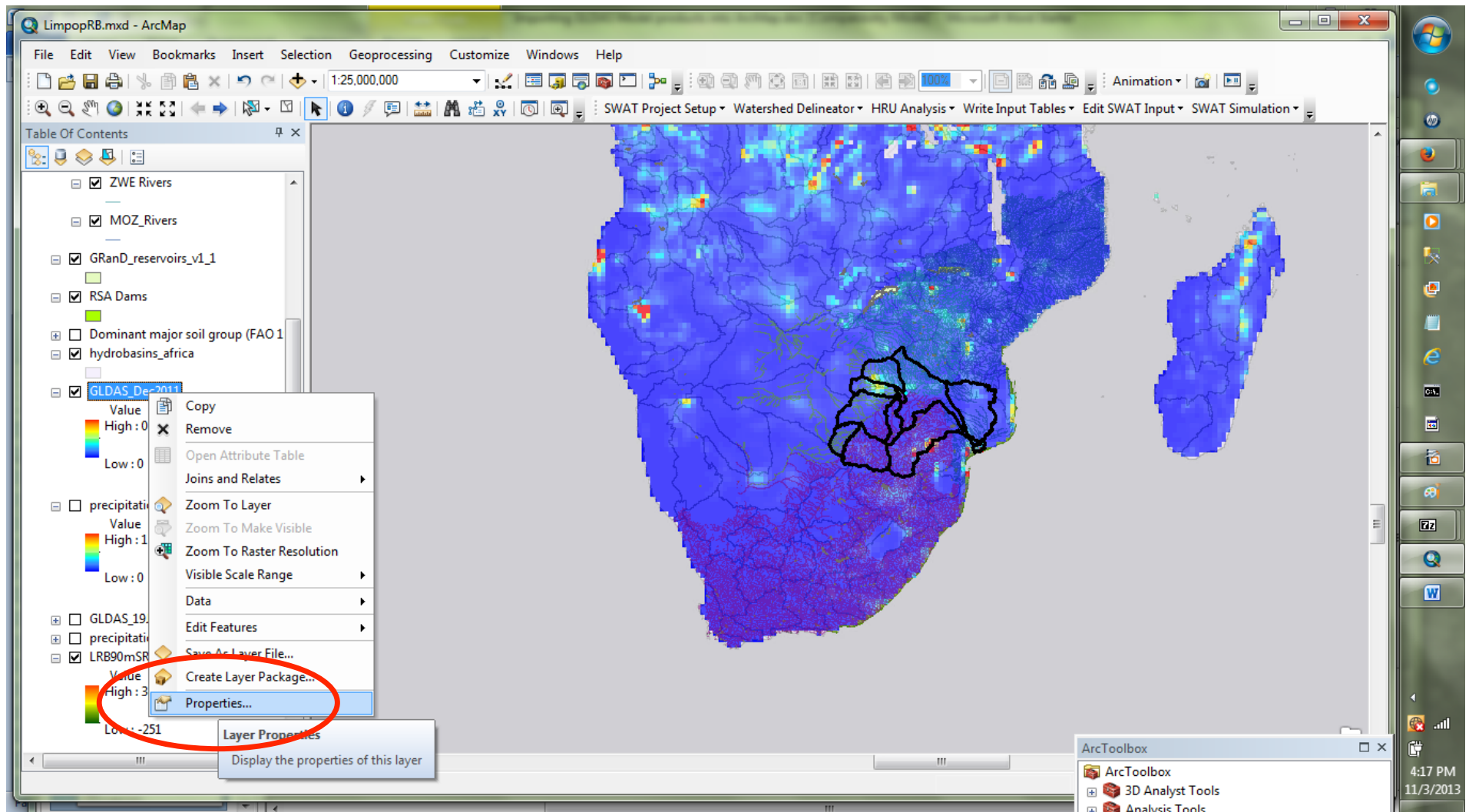
For the X Dimension field, choose longitude (lon).

For the Y Dimension field, choose longitude (lat).

For the Output Raster Layer, type an appropriate name for the resulting raster file to be created. The date, time and variable being displayed are suggested.



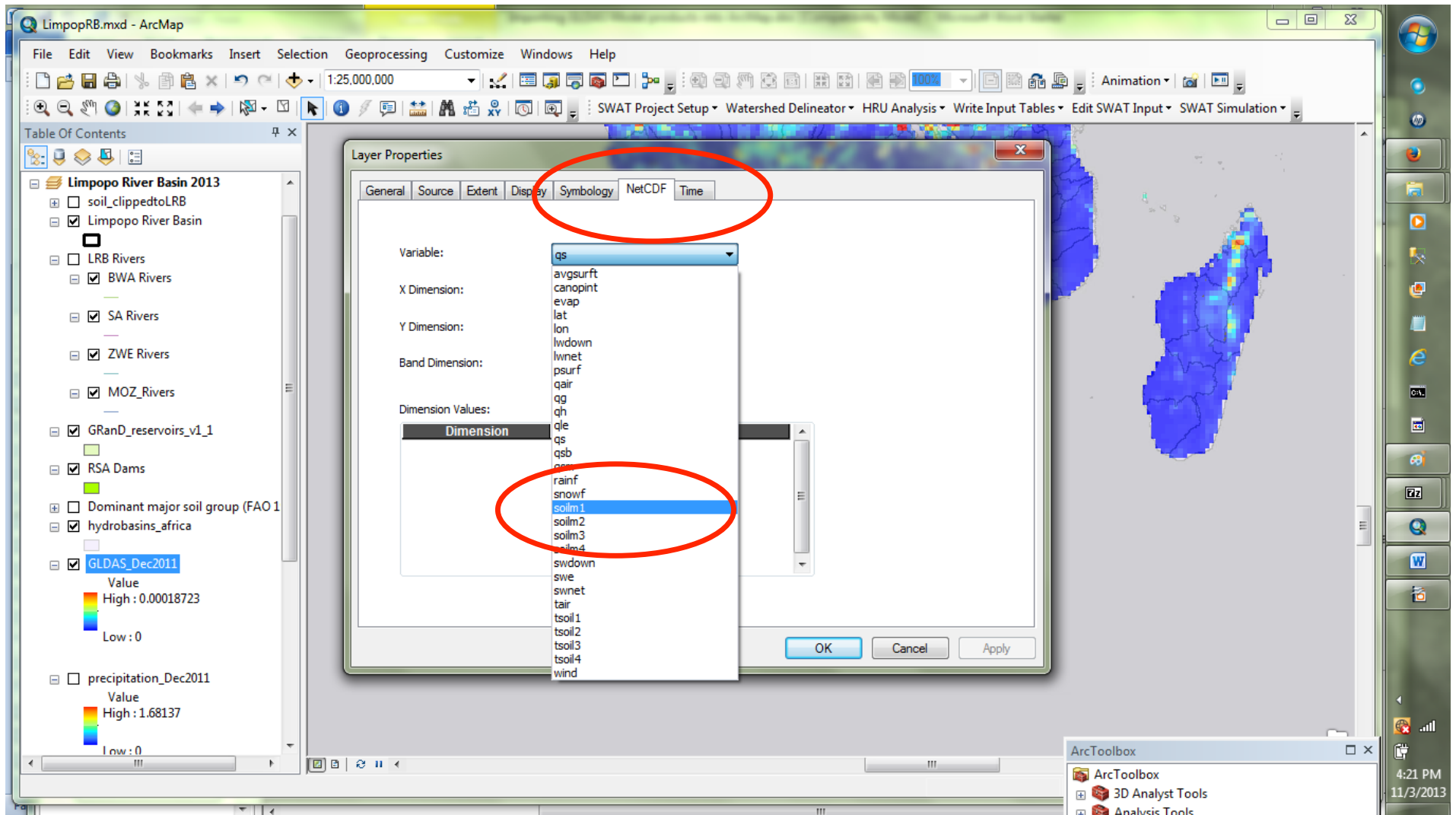
Click ok and the GLDAS product and initial variable chosen in the tool will be displayed as a layer in ArcMap. This is Surface Runoff (**qs**) kg/m²/s



You may choose which model variable will be displayed.

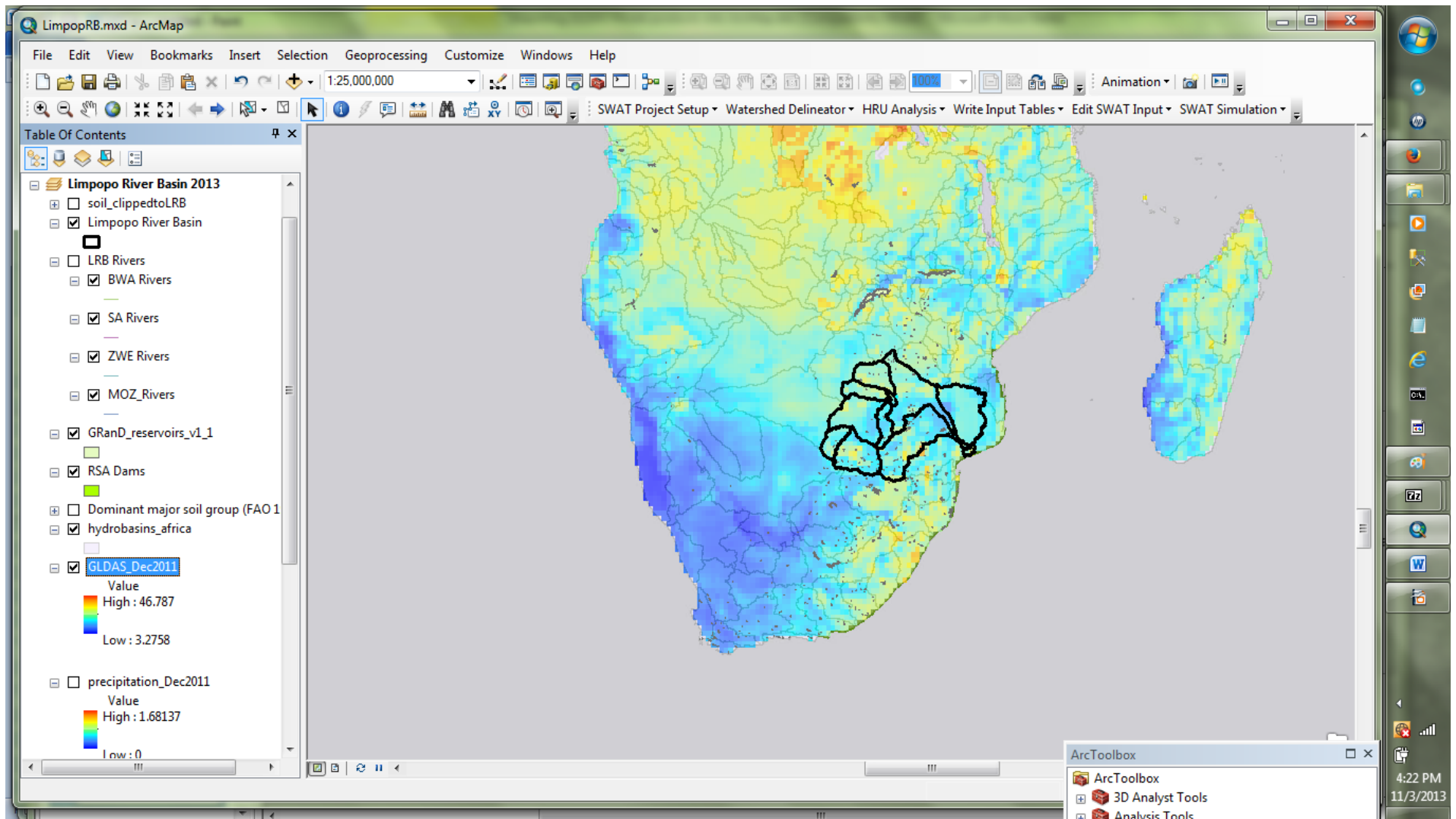
Right click your newly added netCDF layer in the Table of Contents section of ArcMap.

Navigate to the properties and open.



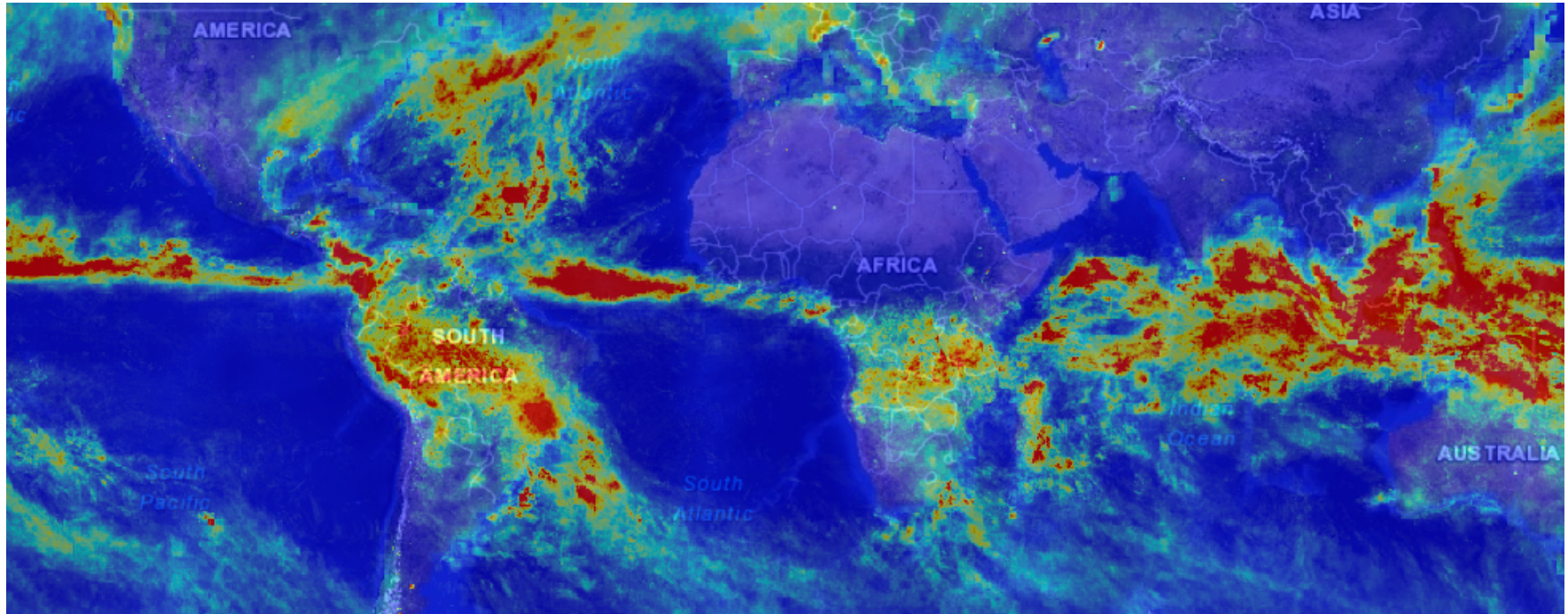
Open the NetCDF tab.

Under the Variable drop down arrow, you may choose which variable to be displayed.



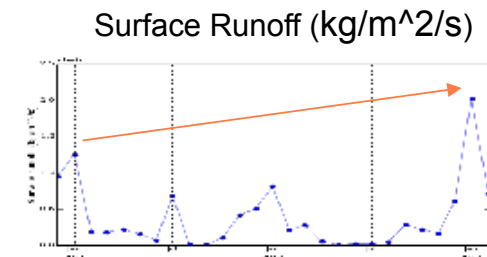
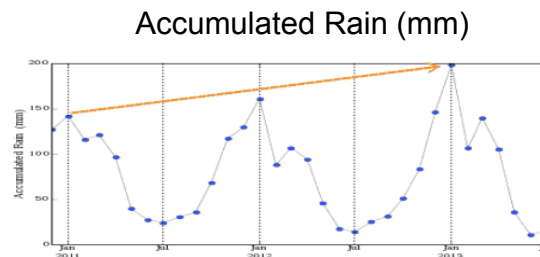
Changed variable soil moisture, 0-10 cm (**soilm1**) kg/m²

While TRMM and GLDAS data was spatially subsetting for Giovanni visualization, when the netCDF files are downloaded the files contain global data.



Annual Comparison of TRMM Accumulated Rain and GLDAS Surface Runoff in the Limpopo River Basin

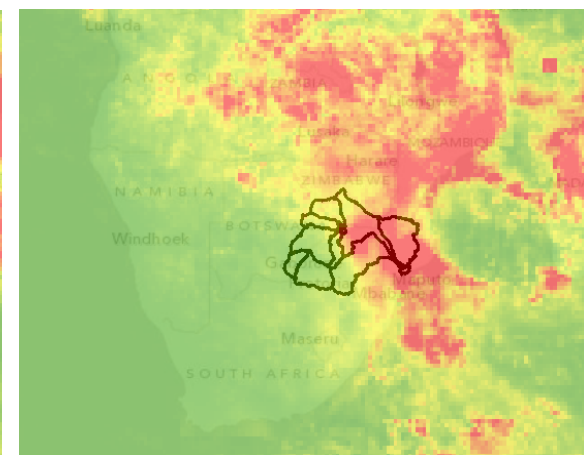
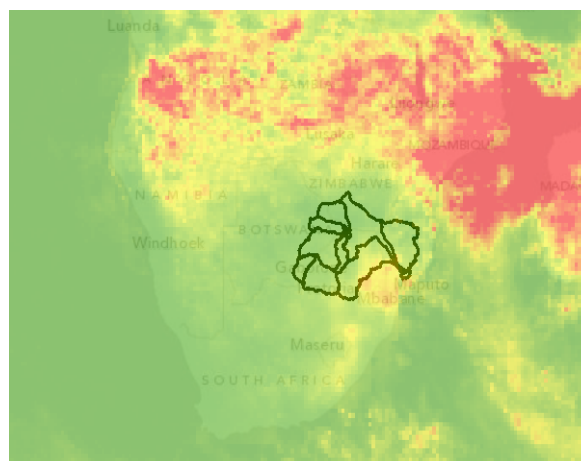
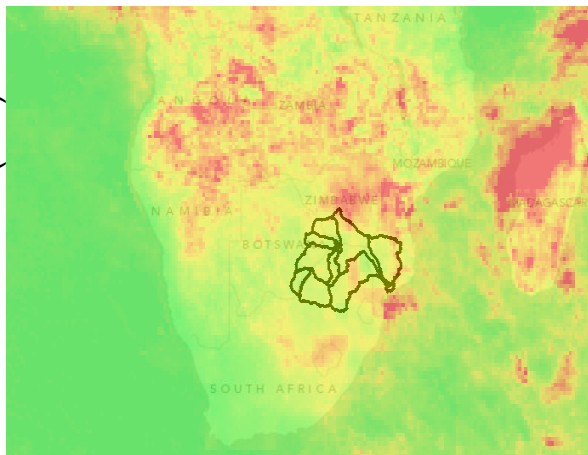
January 2011



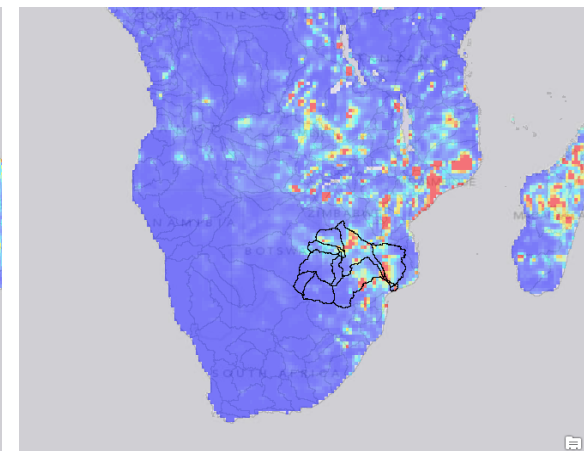
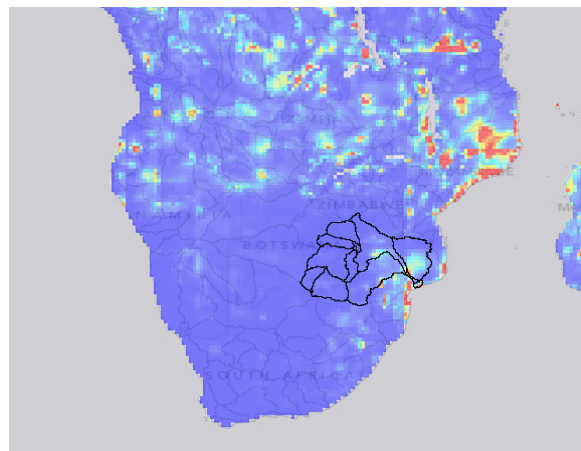
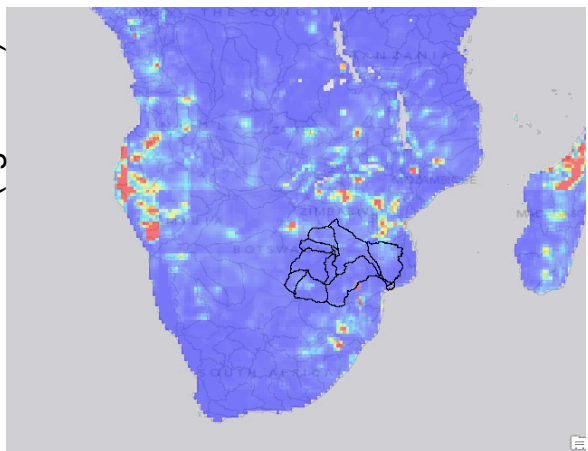
January 2012

January 2013

Accumulated rain (mm)

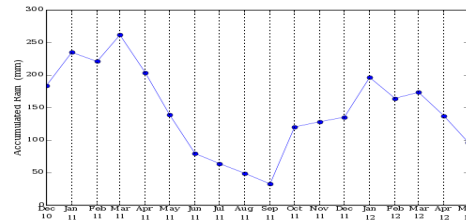


Surface runoff (kg/m²/s)

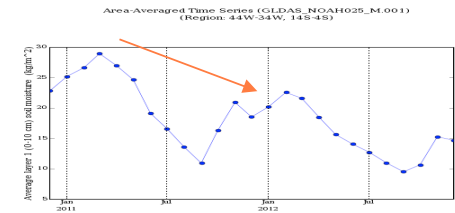


Seasonal and Annual Comparison of TRMM Accumulated Rain and GLDAS Soil Moisture in NE Brazil

Accumulated Rain (mm)



Soil Moisture (kg/m²)



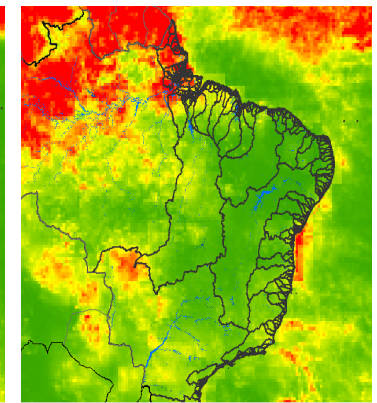
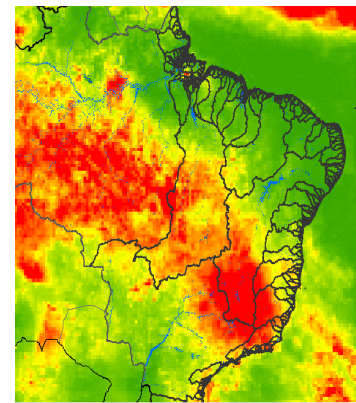
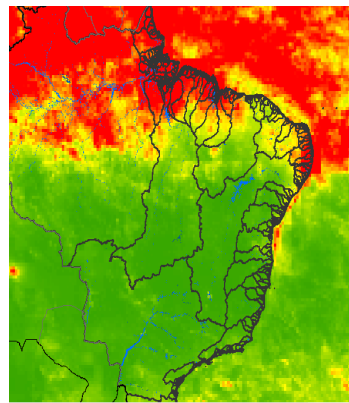
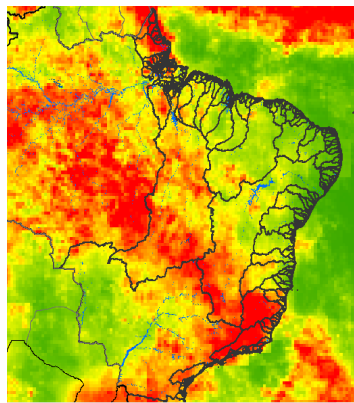
Dec 2010

May 2011

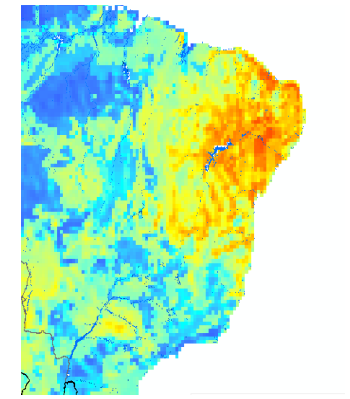
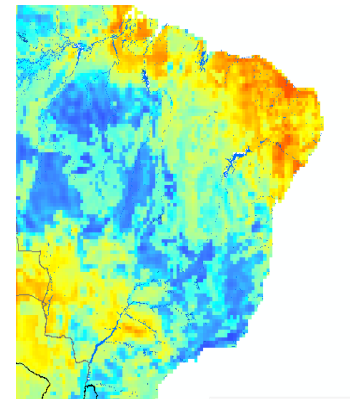
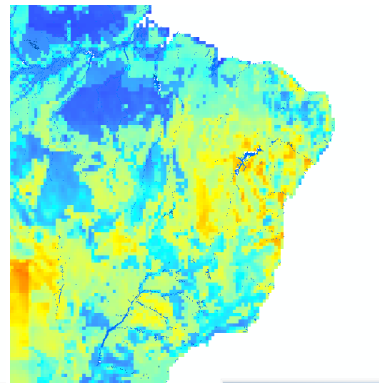
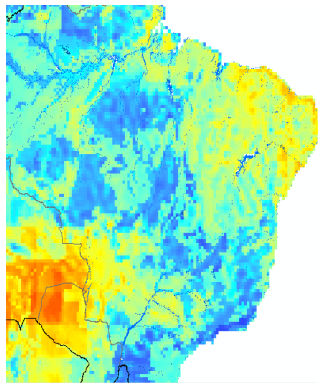
Dec 2011

May 2012

Accumulated rain (mm)



Soil Moisture (kg/m²)



GLDAS Variable Abbreviations

avgsurft

** average surface temperature k

canopint

** total canopy water storage kg/m²

evap

** total evapotranspiration kg/m²/s

lwdown

** surface incident longwave radiation w/m²

lwnet

** net longwave radiation w/m²

psurf

** surface pressure pa

qair

** near surface specific humidity kg/kg

qg

** ground heat flux w/m²

qh

** sensible heat flux w/m²

qle

** latent heat flux w/m²

qs

** surface runoff kg/m²/s

qsb

** subsurface runoff kg/m²/s

qsm

** snowmelt kg/m²/s

rainf

** rainfall rate kg/m²/s

swe

** snow water equivalent kg/m²

swdown

** surface incident shortwave radiation w/m²

GLDAS Variable Abbreviations

swnet

** net shortwave radiation W/m^2

snowf

** snowfall rate $\text{kg/m}^2/\text{s}$

soilm1

** 0-10 cm average layer 1 soil moisture kg/m^2

soilm2

** 10-40 cm average layer 2 soil moisture kg/m^2

soilm3

** 40-100 cm average layer 3 soil moisture kg/m^2

soilm4

** 100-200 cm average layer 4 soil moisture kg/m^2

tsoil1

** 0-10 cm average layer 1 soil temperature K

tsoil2

** 10-40 cm average layer 2 soil temperature K

tsoil3

** 40-100 cm average layer 3 soil temperature K

tsoil4

** 100-200 cm average layer 4 soil temperature K

tair

** near surface air temperature K

wind

** near surface wind magnitude m/s